# HEAT TRANSFER IN A PACKED BED REACTOR AT LOW REYNOLDS NUMBERS: THE HYDROGENATION OF ETHYLENE TO ETHANE ON NICKEL CYLINDERS

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HEAT TRANSFER IN A PACKED BED REACTOR AT LOW REYNOLDS NUMBERS: THE HYDROGENATION OF ETHYLENE TO ETHANE ON NICKEL CYLINDERS

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# PREFACE

The heat transfer in a packed, catalytic bed was studied with the hydrogenation of ethylene to ethane acting as the heat source. The flow rate of the gases in the reaction tube was confined to the laminar regime based upon the boundary layer film Reynolds number. The calculated results for this system agree with previous investigations for non-reacting systems.

I am indebted especially to Dr. James W. Fulton, my Thesis Adviser, for his guidance and advice. I also am indebted to Doctors John H. Erbar and Kenneth J. Bell for their serving on my Thesis Review Committee and their offering of many helpful suggestions. The aid of my research associate, Berry Crain, Jr., has been of great value to me and to this thesis.

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# CHAPTER I

## INTRODUCTION

"No branch of chemical engineering is more central to the purposes of the craft than the study of the chemical reactor...(3)"

One of the major aspects of reactor design is heat transfer. Heat transfer characteristics influence the size, shape, and operating conditions of a chemical reactor.

A packed bed reactor operating in laminar flow was chosen for this study. The heat source was the hydrogenation of ethylene to ethane on nickel catalyst cylinders. There were several reasons for this selection. First, the literature contains very little information on generalized heat transfer correlations for packed, catalytic beds which are operated in the laminar flow regime.

Second, the hydrogenation of ethylene to ethane has several characteristics which make it a well-suited reaction for this study:

1. the reaction is highly irreversible;
2. the system has no side reactions;
3. the reaction is completely heterogeneous (i.e., the reaction does not proceed to a measurable extent in the absence of a catalyst);
4. the reaction is relatively simple in chemical reaction mechanism;
5. the reaction is highly exothermic; and,

6. the reaction occurs readily at atmospheric pressure and normal temperatures.

In the laminar flow regime, heat transfer in a catalytic, packed bed is a function of the reaction rate, bulk fluid temperature and pressure, fluid flow rate, physical properties of the fluid and catalyst, and shape and size of both the catalyst particle and the reactor. The method used currently to describe heat transfer in flow reactors is to correlate a dimensionless quantity, the heat transfer j-factor, with the Reynolds number.

The purpose of this study has been to obtain this heat transfer correlation for a heterogeneous catalytic reaction occurring in a packed bed reactor operated in laminar flow.

# CHAPTER II

# REVIEW OF THE LITERATURE

## Reaction Kinetics

Articles on heterogeneous catalysis and the hydrogenation of ethylene to ethane are readily available in the literature (7,12, 13,21,30,42,44,47,51,57,59,60,62,65,66). Rideal (51) used a relatively inert nickel catalyst on a strip of nickel foil to study the rate of reaction of the hydrogenation of ethylene. He made the important observation that oxygen inhibited the reaction; the hydrogenation of ethylene was negligible until all of the oxygen had been converted to water.

Sussman and Potter (55) studied the hydrogenation of ethylene in a flow reactor. They observed that the controlling step was the surface reaction between the adsorbed olefin and hydrogen which was adsorbed with disassociation. It was noted that hydrogen was only weakly adsorbed in comparison to the ethylene.

Bond (7) summarized the experimental data and results of previous investigators who had studied the hydrogenation of ethylene on nickel and other catalysts. Pauls, Comings, and Smith (44) obtained reaction rate and kinetics data for the hydrogenation of ethylene on a catalyst similar to the nickel-on-alumina catalyst used in this study.

The catalytic effectiveness factor and reaction rate have been investigated by Carberry (12), Prater (47), and Weisz (66).

Chu and Hougen (15) and van Krevelen and Hoftijzer (62) have reported the dependency of the effectiveness factor upon adsorption in a heterogeneous chemical reaction. Thiele (59) reported that below a certain grain size, the activity of the catalyst was proportional to the weight of catalyst present. Fulton (21) studied the influence of catalyst particle size upon the reaction kinetics of the hydrogenation of ethylene to ethane.

## Heat Transfer

The heat transfer coefficient, h, is defined by:

$$Q = hA\Delta T \qquad \text{(II-1)}$$

where,

$Q$ = heat transferred per unit time, Btu/hr.

$A$ = cross-sectional area perpendicular to flow of heat, sq. ft.

$T$ = temperature, °F.

$h$ = proportionality constant, determined experimentally, Btu/(hr.-sq. ft.-°F).

Originally the heat transfer coefficient in a packed bed was correlated as a function of the characteristic dimensions of the bed, average fluid temperature, and mass velocity (1,14,18,22,32, 36,37,38,39). Kern (32) summarized some of these correlations.

Chilton and Colburn (14) defined the heat transfer j-factor, $j_h$, as:

$$j_h = (h/C_pG)(N_{Pr})_f^{2/3} \qquad \text{(II-2)}$$

where,

$N_{Pr}$ = Prandtl number = $C_p\mu/k$, dimensionless

$\mu$ = viscosity, lb./(ft.-hr.)

$k$ = thermal conductivity, Btu/(hr.-sq. ft.-°F.)

$f$ = refers to physical properties evaluated at arithmetic average of surface and bulk temperatures.

Data have been reported for the heat transfer j-factor as a function of Reynolds number in packed beds, but most of the studies were for non-reacting systems (5,19,24). Eichhorn (19) developed a j-factor correlation for dielectrically-heated plastic particles in a packed bed. His correlation was:

$$j_h = 0.235\ (N_{Re})^{-0.35}$$

for, $1 < N_{Re} < 18$

Baumeister and Bennett (5) electrically heated metal spheres in a packed bed. Their correlation was:

$$j_h = 0.918(N_{Re})^{-0.29}$$

for, $200 < N_{Re} < 10,400$

Glaser and Thodos (24) also electrically heated metal spheres in a packed bed; the correlation that they obtained was:

$$j_{h_o} = \frac{0.535}{(N_{Re})^{0.3} - 1.6}$$

for, $100 < N_{Re} < 10,000$

where, $(j_h/j_{h_o}) = 1.0 + 10.73 \frac{(a_p)^{0.5}}{D_t} (N_{Re})^{-.384}$

for, $\frac{(a_p)^{0.5}}{D_t} >> 0.0$

$N_{Re} = (D_p G)/(1-\epsilon)\phi\mu$

$\epsilon$ = bed void fraction, dimensionless

$a_p$ = particle surface area, sq. ft./particle

$\phi$ = shape factor, described by Aris (2)

$D_t$ = diameter of reactor tube, ft.

The use of the $j_h/j_{h_o}$ correlation was intended for cases in which the particles were large enough, with respect to the tube diameter, to create wall and packing effects.

The only heat transfer j-factor correlation for a chemically reacting system was obtained by Satterfield and Resnick (50). They studied the decomposition of hydrogen peroxide on catalytic spheres. They developed:

$$j_h = 0.992(N_{Re})^{-0.34}$$

for, $15 < N_{Re} < 161$

Although Satterfield and Resnick correlated the j-factor to the Reynolds number in a catalytic, packed bed, they also showed that their flow stayed entirely in the turbulent flow regime.

## Mass Transfer

It is necessary to enter the area of mass transfer studies to obtain j-factors in fully developed laminar flow in a packed bed. Chilton and Colburn (14) defined the mass transfer j-factor, $j_d$, as

$$j_d = \frac{k_G M p_{BM}}{G} (N_{Sc})^{2/3}$$

where, $k_G$ = mass transfer coefficient, $\frac{\text{lb-moles}}{\text{hr.-sq-ft.-atm.}}$

$M$ = molecular weight, lb/lb-mole

$p_{BM}$ = mean partial pressure of inerts, atm.

$N_{Sc}$ = $\mu/\rho D_i$, dimensionless.

$\rho$ = density, lb/cu. ft.

Several authors have proposed values of the ratio, $j_h/j_d$, ranging from 0.8 to 1.5 (14,23,49,50). In any case the following values

of the $j_d$ versus Reynolds number correlation are given to illustrate the spread of reported data.

$$j_d = 16.8/N_{Re} \qquad N_{Re} < 40 \tag{23}$$

$$j_d = 0.18(N_{Re})^{-.376} \qquad 1 < N_{Re} < 400 \tag{40}$$

$$j_d = 0.66(N_{Re})^{-.46} \qquad 0.17 < N_{Re} < 250 \tag{4}$$

Most, if not all, of the variation in the data may be attributed to the range of Reynolds numbers included. The transition region from laminar to turbulent flow in a packed bed may occur for a Reynolds number range:

$$10 < N_{Re} < 1000 \tag{50}$$

In addition it has been shown that, in the laminar regime, the slope of the j-factor versus Reynolds number plot (on log-log coordinates) may change from a positive value at low Reynolds number to a negative value at a higher Reynolds number (4,48). Bar-Ilan and Resnick (4) reported that, for the sublimation of naphthalene spheres in an air steam, the maximum j-factor occurred at a Reynolds number of approximately 1.5. Later, Resnick and White (48) reported that the maximum occurred at Reynolds numbers of 2, 20, and 100. They observed that this variation was created by different sized particles.

From the state of confusion of the reported data it would seem quite beneficial to obtain a good heat transfer j-factor correlation for the laminar flow regime. That is the purpose of this study.

# CHAPTER III

## APPARATUS

The apparatus may be divided into four units: feed system, reactor, temperature measuring system, and the gas analysis system. A schematic diagram of the apparatus appears in Figure 1 on page 9.

### Feed System

Hydrogen and ethylene gases were fed from commercial cylinders with constant pressure regulators and pressure reducing needle valves. Each gas passed separately through a purifier, another needle valve for fine flow control, a drying bottle, a capillary flowmeter, and the gas-mixing flask.

A Deoxo catalytic purifier for electrolytic hydrogen was used in the hydrogen line to reduce any oxygen present to water. A heated purifier containing Deoxo Model C catalyst was used for the removal of oxygen and sulfur in the ehtylene feed.

Both gas streams passed from their purifiers through drying bottles containing Drierite which removed the water vapor.

Triethylene glycol was used in both capillary flowmeters because of its low vapor pressure at room temperature (the operating temperature for the flowmeters). The gas mixing chamber was a 50-ml. Erlenmeyer flask.

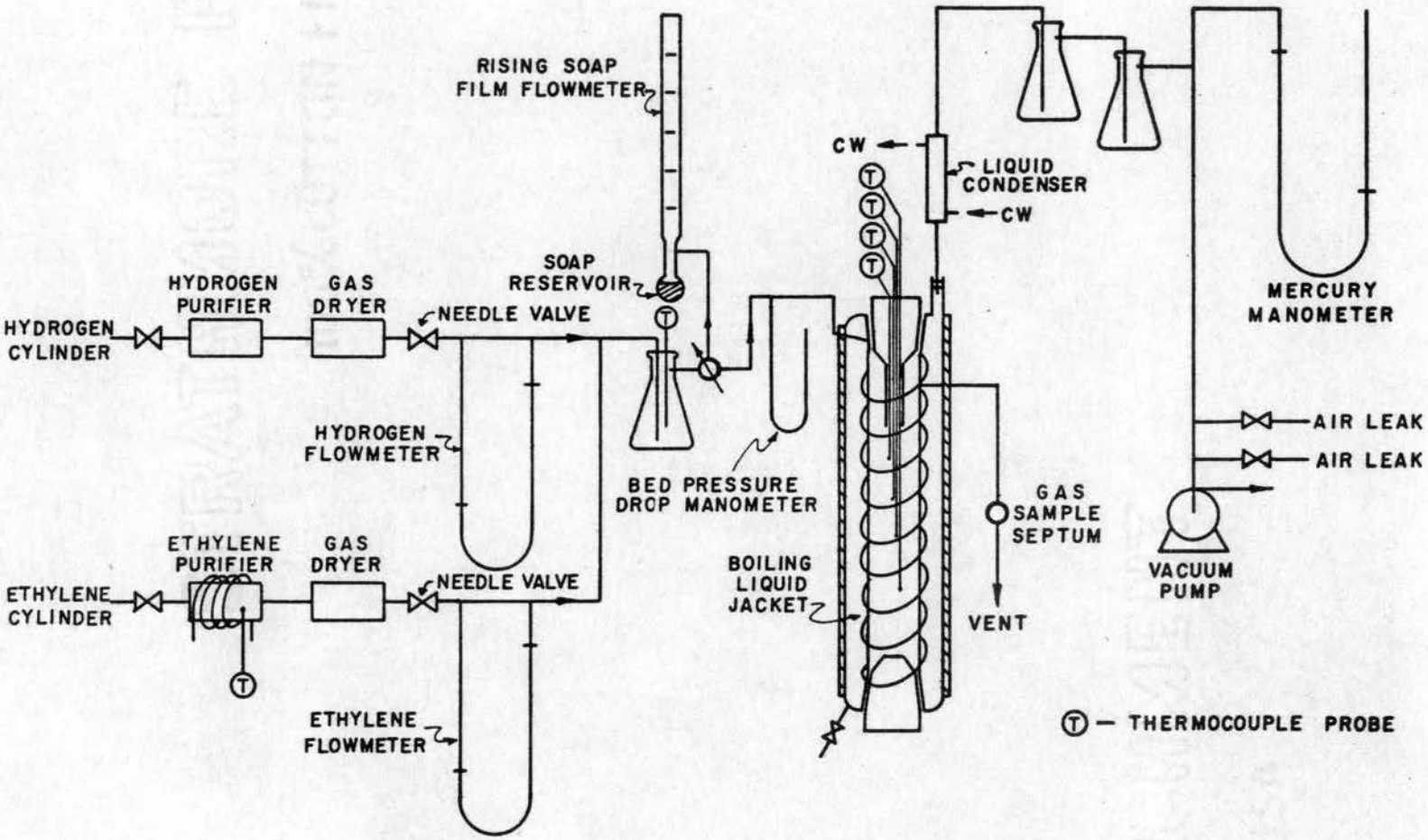


Figure 1. Schematic Diagram of Apparatus.

## Reactor

A detailed diagram of the reactor is shown in Figure 2, page 11. The entering gases passed through the preheater helix of 7-mm. glass tubing which was wrapped around the reaction tube and were fed into the bottom of the reaction tube. The gases passed from the bottom of the reaction tube upwards through the dispersed catalyst bed and out the side gas tube.

The preheater helix and reaction tube were surrounded by a boiling liquid which served the dual purpose of preheating the gases to reaction temperature and providing a nearly constant bulk gas temperature in the reaction tube.

The boiling liquid was contained by a glass jacket which was heated by an insulated electrical resistance wire helix. The temperature of the liquid was controlled by regulation of the vacuum above it.

Both the top and the bottom of the reaction tube were plugged with ground glass plugs. These plugs aided in the loading and unloading of the reaction tube. In addition, the top plug contained a 14-mm. glass tube which served as an exit tube for the thermocouple wires which were attached to particles in the bed.

## Temperature Measuring System

All temperatures, except room temperature, were sensed by iron-constantan thermocouples.

The entering and exit bulk gas temperatures were sensed by thermocouples inserted into 3-mm. glass balls which were placed

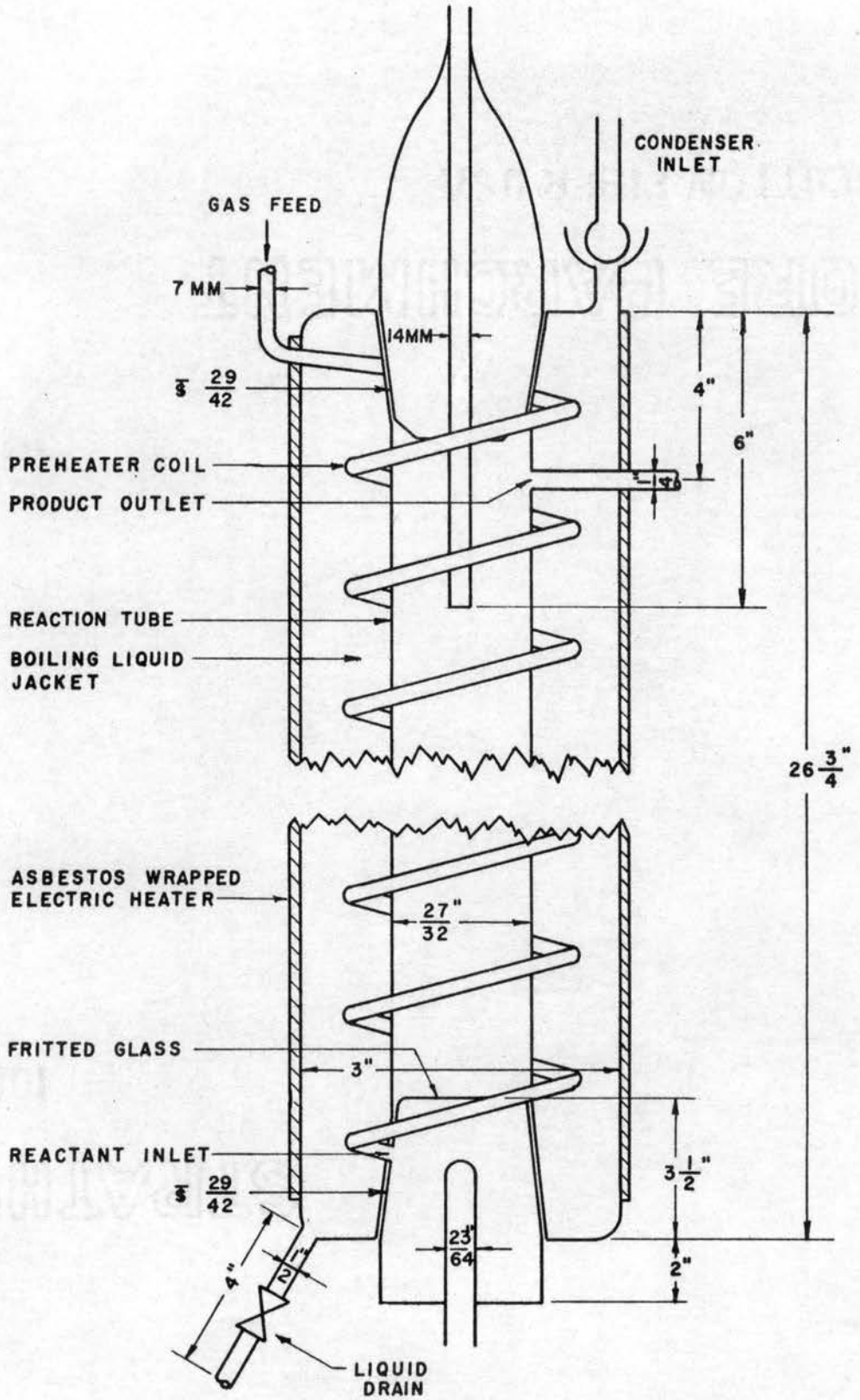


Figure 2. Detailed Diagram of the Reactor.

at the bottom and top of the packed bed. Catalyst temperatures were sensed by thermocouples inserted in them.

The voltage potential of each thermocouple was measured by a Leeds and Northrup Potentiometer, Model No. 8686.

## Gas Analysis System

The reactant and product streams were analyzed by a vapor phase chromatograph. A quarter-inch copper tube, four feet in length, packed with finely divided silica gel was used as the separation column. A helium flow of 100 cc. per minute was used for the column and the thermal conductivity cell. Both the column and the cell were kept at a constant temperature of 165°F. with boiling acetone.

The analysis was determined by the area-weight fraction method (40,45).

# CHAPTER IV

# MATERIALS

The materials used in this study were the catalyst, the bed dispersing agent, and the reactant gases, hydrogen and ethylene.

## Catalyst

The catalysts used for this study were nickel on alumina cylinders. The catalyst, supplied free of charge by Girdler Catalysts, was Girdler Catalyst No. T-310, sample No. 10-152. The catalyst contained 10-12% by weight nickel and the particles averaged 3.08-mm. in diameter and 3.55-mm. in length.

The catalyst was obtained in its unreduced form (NiO), and it was reduced after it was packed in the bed. Reduction was accomplished by passing hydrogen over the catalyst while maintaining a packed bed temperature of 700°F. with Hitec molten salt. The reduction period was ten hours and only hydrogen and ethylene were exposed to the catalyst after reduction in order to prevent deactivation.

## Dispersing Agent

The dispersing agent chosen was a bed of 3-mm glass spheres. These spheres were nearly the same size as the catalyst cylinders.

## Reactant Gases

The hydrogen was taken from commercial gas cylinders. The

hydrogen, manufactured by the electrolytic process, was about 99% pure.

Pure grade ethylene was supplied free of charge by the Phillips Petroleum Company. The mole percent purity was 99.3% with traces of acetylene, carbon monoxide, carbon dioxide, sulfur, oxygen, and water.

# CHAPTER V

## EXPERIMENTAL PROCEDURE

The description of the experimental procedure for this study is divided into six sections: preparation of the temperature sensing system; method of packing the reactor; calibration of the flowmeters; reduction of the catalyst; procedure during a reaction run; and the method of analyzing the product streams.

### Temperature Sensing System

Several methods were attempted for the insertion of the thermocouples in the glass spheres and catalyst cylinders. The method finally adopted consisted of: abrading a hole in the cylinder or sphere; cementing the thermocouple bead in the hole; coating the thermocouple wires; and connecting the thermocouple wires to the potentiometer.

Holes were drilled into the catalyst cylinders and glass spheres with an air and fine sand abrasive unit. This operation produced a uniform, conical hole in both the catalyst cylinders and the glass spheres.

The cement used was Sauereisen ceramic cement. This material was received in a dry, powdered form; and it was mixed with a small amount of water to form a very thick slurry. A thermocouple bead was dipped into the slurry and inserted into the conical hole in the particle. The cement was allowed to dry overnight.

A thinner solution of Sauereisen cement was used to coat the thermocouple wire. The wires were first thoroughly cleaned with vinegar, rinsed with distilled water, and dried. The Sauereisen was coated onto the wires with a small, oil-paint brush; and each coat was allowed to dry in air for six hours. Three coats were applied to each thermocouple wire.

After the bed was packed, the thermocouple wires were threaded out through the top ground glass plug in the reaction tube and soldered to a multi-point radio switch. Lead wires were soldered from the common poles on the radio switch to the poles on the potentiometer.

## Packing the Reactor

After the bottom plug was inserted into the reactor, two inches of glass wool were placed at the bottom of the reaction tube. A glass sphere with a thermocouple in it was placed on top of the glass wool. Three inches of 3-mm. glass spheres were poured on top of that glass sphere. Then a catalyst particle with a thermocouple in it was placed on top of the glass spheres, and more glass spheres were placed on the catalyst particle. More catalyst particles and glass spheres were added until the desired number of particles were in the bed.

The beds for different runs contained from three to nine catalyst particles.

## Calibration of Flowmeters

The flowmeters were calibrated before and after each reaction

run. Tygon tubing was used to connect the outlet of the capillary flowmeters with a rising soap-film flowmeter. The volumetric flow was obtained by measuring the time required for the soap film, stretched across the rising film flowmeter, to rise the length of the flowmeter. The volumetric flow rate was obtained by dividing the volume of the flowmeter (100 cc.) by the time required for the soap film to displace this volume.

In addition to the capillary flowmeters used to measure the flow of the reactant gases, a manometer was installed to measure the pressure drop across the bed.

## Catalyst Reduction

With the boiling liquid jacket empty, hydrogen was fed to the reactor at the rate of one gram-mole per hour; and it was allowed to purge the reactor for one hour. Finely-ground Hitec was added to the jacket, and the heaters were turned on. The reactor and salt were heated to 300°F., the melting point of Hitec. As the Hitec melted, more was added to keep the level of the Hitec above that of the packed bed. This process took about four hours.

After all the Hitec had melted, the current to the heaters was increased; and the reaction tube and molten salt were heated to 700°F. The reactor was allowed to remain at 700°F. for ten hours, and the hydrogen rate was continued at 1.0 gm-mole/hr. to prevent deactivation of the catalyst. After the catalyst particles were reduced, the molten salt was drained from the reactor, the heaters turned off, and the reactor allowed to cool.

## Reaction Run

After reduction, the reactor jacket was rinsed with water three times and filled with two liters of distilled water. The heaters were turned on again, and the reactor was brought to the desired temperature for the reaction run.

When the reactor reached the desired temperature, the hydrogen flow rate was adjusted to 2.00 cc./sec.; and the ethylene flow was begun and adjusted to 0.50 cc./sec. The hydrogen-to-ethylene molar ratio of four-to-one was held constant throughout the reaction run; a greater concentration of ethylene has been shown to coke the catalyst surface (7).

After the reactor reached steady state, which took approximately twenty minutes, one reactant gas sample, four product gas samples, and three thermocouple readings were recorded. The product gas samples were taken every eight minutes, and the thermocouple readings were recorded while the gas samples were being eluted from the chromatograph column.

The flow rates were increased to 4.00 cc./sec. for the hydrogen and 1.00 cc./sec. for the ethylene after the last gas sample had been taken for the first set of flow rates. The reaction run was continued in this manner until all the desired readings had been taken; then the flow rates were reduced to their original values (2.00/0.50) and the readings were repeated to detect any change in catalyst activity. After all readings were taken, the ethylene flow was stopped, the heaters turned off, and the bed allowed to cool with hydrogen flowing through it.

## Product Stream Analysis

Five cc. gas samples were taken from the product stream every eight minutes and injected into the chromatograph injection port. The inlet gas stream, product gas stream, and the injection port were equipped with rubber setpums through which the gas sample could be withdrawn or injected with a gas syringe and needle.

As stated in the previous chapter, the chromatograph curves were analyzed by the curve area-weight fraction method applicable to short-chained alkanes and alkenes (40,45). In this method the ratio of the areas under the elution curves for short-chained alkanes and alkenes is equal to the ratio of the weight fractions of the two components.

# CHAPTER VI

## EXPERIMENTAL RESULTS

### Experimental Data

Several runs were made with different bed packings. The flow rate through the reactor was always in the laminar flow regime (i.e., the Reynolds numbers were equal to or less than 3.0).

The number of catalyst particles in the packed bed was varied from nine for the first run to three for the last run. The flow rate for each run was varied from a Reynolds number of 0.2 to a Reynolds number of 3.0. The bulk gas temperature was varied from 83°F. to 207°F. The packing and bulk temperature were constant for any one run.

As the flow rate was increased, the percent conversion of ethylene in the product stream decreased; and the surface temperature of the catalyst particles increased. The dependence of the conversion upon Reynolds number is shown in Figure 3 on page 21. The dependence of the catalyst surface temperature upon the Reynolds number and the bulk gas temperature is shown in Figure 4 on page 22.

The maximum bed pressure drop was 0.8 in. triethylene glycol; therefore, this pressure drop was negligible in the flowmeter calibrations.

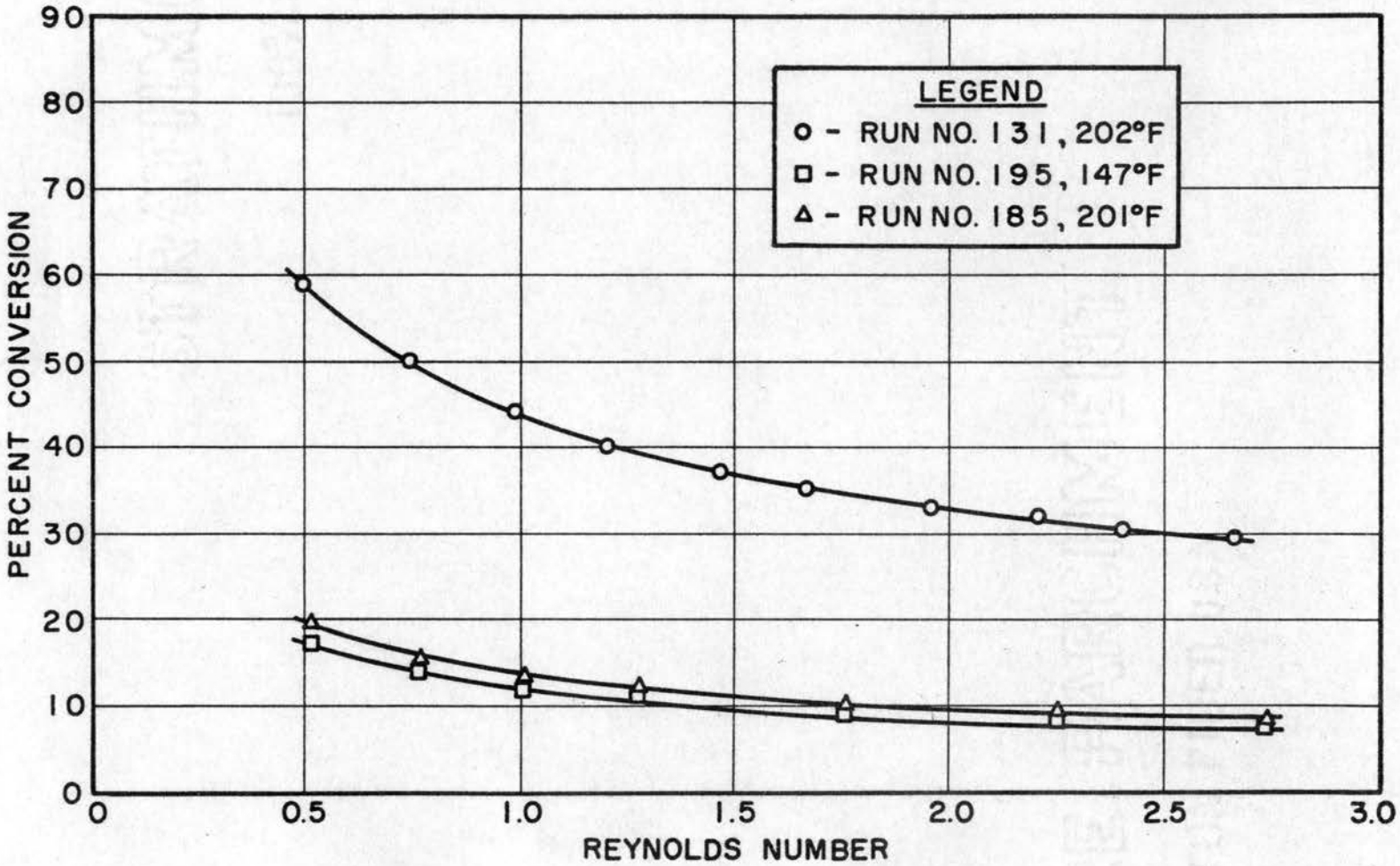


Figure 3. Dependence of Conversion upon Reynolds Number.

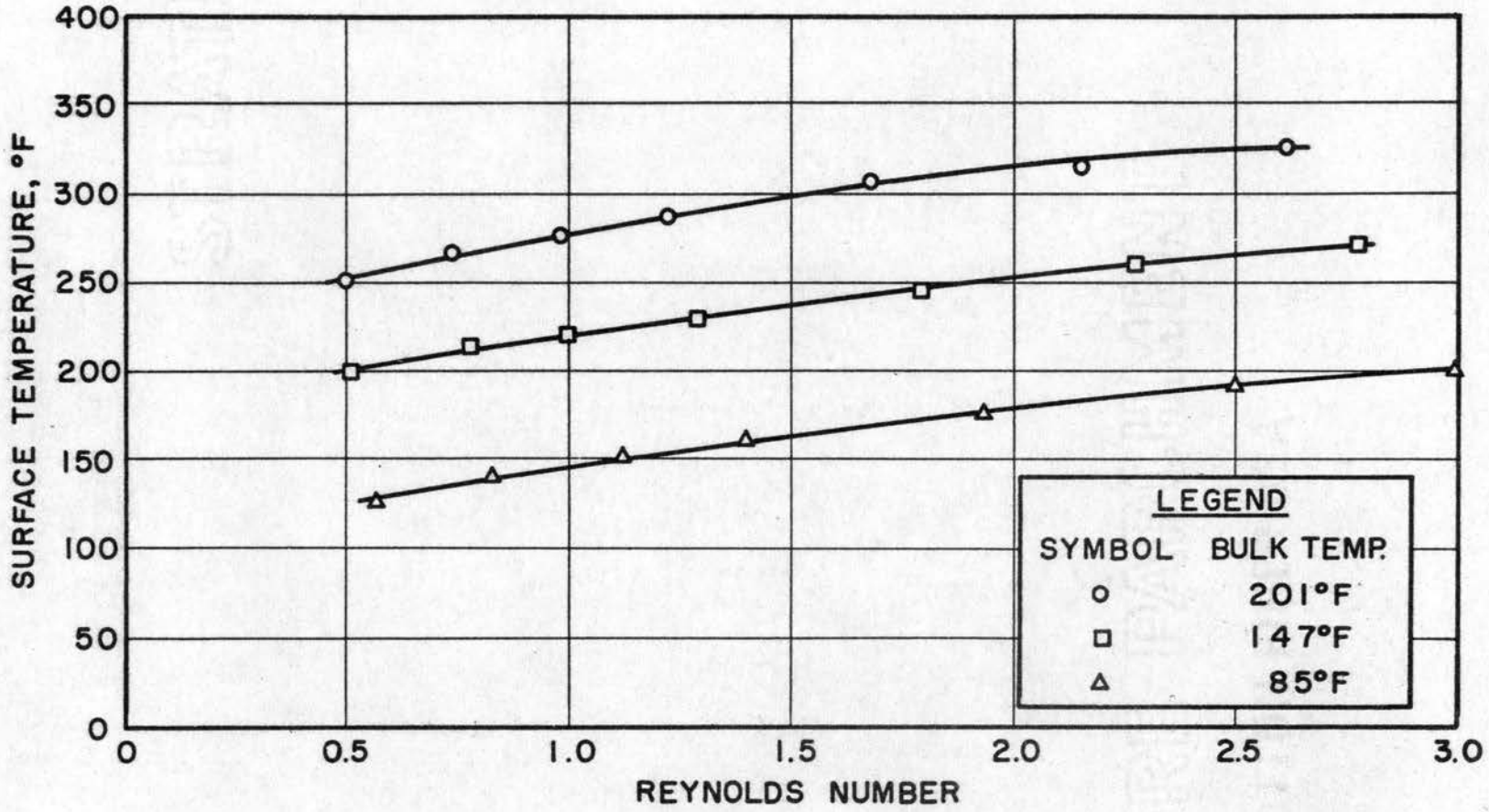


Figure 4. Dependence of Surface Temperature upon Reynolds Number.

## Calculations

The heat of reaction was calculated at the surface temperature of the catalyst particles by the following equation (55):

$$\Delta H_T = \Delta H_R^o + \int_{298}^{T} \Delta C_p dT \qquad \text{(V-1)}$$

The heat transfer coefficient was calculated from:

$$h = \frac{Q}{a_p(T_s - T_b)} \qquad \text{(V-2)}$$

where,

$Q$ = heat generated by reaction on one particle, Btu/hr.

$a_p$ = external surface area of the particle, sq.ft. per particle

$T_s$ = surface temperature of the particle, °F.

$T_b$ = average bulk gas temperature, °F.

The heat transfer j-factor was calculated from Equation (II-2):

$$j_h = (h/C_p G)(N_{Pr})^{2/3} \qquad \text{(II-2)}$$

A detailed explanation of the calculations appears in Appendix A, and necessary assumptions appear in Appendices E and F. The computer program which was used to calculate the j-factors and Reynolds numbers is described in Appendix B, and the computer program used to curve fit the data is described in Appendix C. The experimental data and the calculated j-factors and Reynolds numbers are in Appendix D.

# CHAPTER VII

# DISCUSSION OF RESULTS

## Interpretation of Data

From Figure 3 it is apparent that the percent conversion of ethylene to ethane was directly proportional to the amount of catalyst present and inversely proportional to the flow rate through the packed bed. For example, Run No. 131 had nine catalyst particles in the bed, and Run No. 195 had three catalyst particles in the bed. The percent conversion for Run No. 131 was approximately three times that of Run No. 195 at any one flow rate. Figure 3 also shows that the percent conversion was relatively independent of the bulk gas temperature. Runs No. 195 and No. 185 both had three catalyst particles in the bed, but Run No. 195 was at a bulk gas temperature of 147°F. and Run No. 185 was at 201°F.

Figure 4 shows that the catalyst surface temperature increased with increased flow rate, but the temperature drop between the bulk gas and the catalyst surface was almost constant.

## Correlation of Data

The calculations from the experimental data show the effect of the Reynolds number upon the heat transfer j-factor for this reacting system. Figure 5 on page 25 shows this relationship for all the calculated experimental points (2051 points). A least

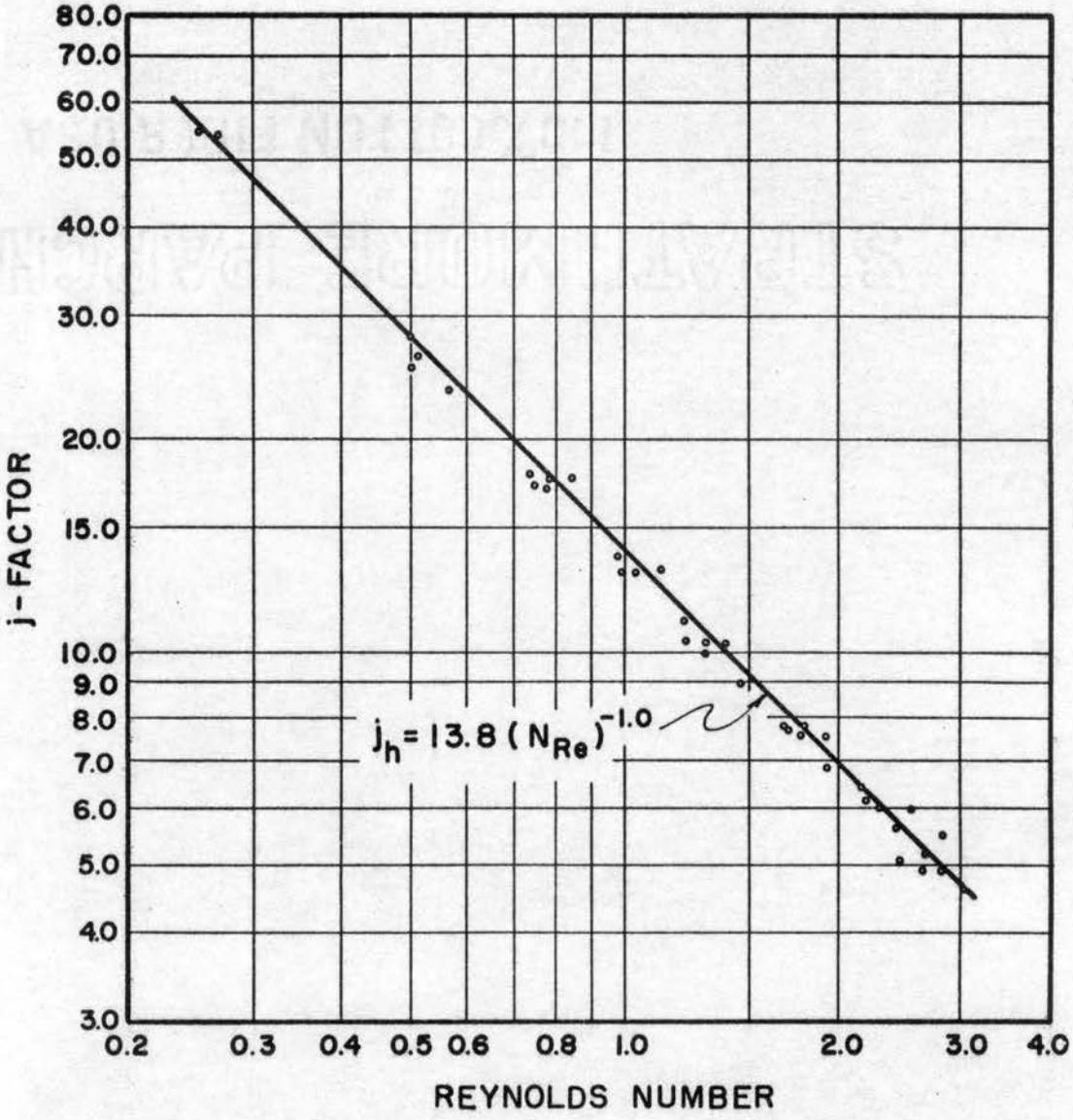


Figure 5. Presentation of Calculated j-Factors and Reynolds Numbers.

squares curve-fit for these points gave: $j_h = 13.8(N_{Re})^{-1.005}$. The standard deviation was 7.35 and the percent average deviation was 12.4%.

All points which were more than three standard deviations from the calculated line were rejected and the points were curve-fitted again. The remaining points (2024 points) formed the line, $j_h = 13.6(N_{Re})^{-0.969}$. The standard deviation of this line was 2.589 and the percent average deviation was 11.0%.

## Comparison to Previous Investigations

The correlation obtained agrees with the one proposed by Gamson, Thodos, and Hougen (23), but it does not agree with the correlations obtained by Bar-Ilan and Resnick (4) and by Satterfield and Resnick (49). There is a simple explanation for this disagreement. Bar-Ilan and Resnick reported that the Reynolds numbers for their system varied from 0.2 to 250, and Satterfield and Resnick reported that the Reynolds numbers for their system varied from 1.0 to 400. Therefore, the upper range of Reynolds numbers for both of these pairs of investigators indicates that the flow was not laminar, but that it was in the turbulent regime.

# CHAPTER VIII

## CONCLUSIONS

The heat transfer j-factor may be correlated with the Reynolds number for the flow of fluids through packed beds. This correlation has been extended to the laminar regime for a gas mixture reacting heterogeneously on a catalyst surface in a packed bed. This study indicated that the relationship is:

$$j_h = 13.8(N_{Re})^{-1.0}$$

where the heat transfer factor, $j_h$, is defined as:

$$j_h = (h/C_p G)(N_{Pr})_f^{2/3}$$

## NOMENCLATURE

$a_p$ = Particle external surface area, sq. ft./particle.

A = Cross-sectional area for heat flow, sq. ft.

$C_p$ = Heat capacity, Btu/(hr.-sq. ft.-°F).

D = Diameter, ft.

$D_i$ = Diffusion coefficient, sq. ft./hr.

f = Fanning friction factor, dimensionless.

G = Superficial mass velocity, lb./(hr.-sq. ft.).

h = Heat transfer coefficient, Btu./(hr.-sq. ft.-°F.

k = Thermal conductivity, Btu./(hr.-sq. ft.-(°F/ft.)).

$k_g$ = Mass transfer coefficient, lb-mole/(hr.-sq. ft.-atm.).

M = Molecular weight, lb./lb-mole.

$N_{Pr}$ = Prandtl number, $(C_p\mu/k)$, dimensionless.

$N_{Re}$ = Reynolds number, $(DG/\mu)$ (unless otherwise defined), dimensionless.

$N_{Sc}$ = Schmidt number, $(\mu/\rho D_i)$, dimensionless.

T = Temperature, °F.

$\epsilon$ = Bed void fraction, dimensionless.

$\mu$ = Viscosity, lb./(ft.-hr.).

$\rho$ = Density, lb./cu. ft.

$\phi$ = Shape factor, dimensionless.

### Subscripts

b = Bulk gas phase.

BM = Bulk mean.

f = film.

P,p = Constant pressure.

s = Catalyst surface.

t = Reaction tube.

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# APPENDIX A

# SAMPLE CALCULATIONS

# APPENDIX A

## SAMPLE CALCULATIONS

The j-factor and Reynolds number are calculated for a hydrogen flow of 22.0 cc./sec. and an ethylene flow of 5.5 cc./sec. The catalyst surface temperature was 357°F. and the average bulk gas temperature was 208°F. An analysis of the chromatograph curves showed that the weight percent conversion of ethylene to ethane was 31.7%.

1. Molar flow rates:

   Hydrogen rate = (22.0 cc./sec.)(3600 sec./hr.)(1 gm-mole/
   22,400 cc.)(742 mm Hg/760 mm. Hg.)
   (492°R/550°R)
   = 3.08 gm-mole/hr.

   Ethylene rate = 0.77 gm-mole/hr.

2. Molar conversion: Basis = 100 pounds.

   Ethane = 31.7 pounds.

   Ethylene = 68.2 pounds.

   Ethane = (31.7 lb.)(lb-mole/30.1 lb.) = 1.053 lb-mole.

   Ethylene = (68.2 lb.)(lb-mole/28.1 lb.) = 2.425 lb-mole.

   Total = 3.478 lb-mole.

   Mole percent conversion = (1.053/3.478)(100) = 30.35%.

3. Heat of Reaction at 357°F. (55)

   @ 298°F., $\Delta H_r = \Delta H_f(\text{Products}) - \Delta H_f(\text{Reactants})$

   $\Delta H_r = (-20,236) - (-12,496-0)$

   $\Delta H_r = -32,732$ cal./gm-mole.

@ 357°F., $\Delta H_{357} = \Delta H_{298} + \int_{298}^{357} \Delta C_p dT$

$\Delta C_p = C_p(\text{Products}) - C_p(\text{Reactants})$

$C_p(\text{Hydrogen}) = 6.947 - 0.200 \times 10^{-3}T + 0.481 \times 10^{-6}T^2$

$C_p(\text{Ethylene}) = 2.830 + 28.601 \times 10^{-3}T - 8.72 \times 10^{-6}T^2$

$C_p(\text{Ethane}) = 3.019 + 28.120 \times 10^{-3}T - 8.537 \times 10^{-6}T^2$

($C_p$ in Btu/(lb-mole-°F.) and T in °R.)

$\Delta C_p = - 6.758 - 0.281 \times 10^{-3}T - 0.292 \times 10^{-6}T^2$

$\Delta H_{357} = \Delta H_{298} + \int_{298}^{357} \Delta C_p dT$

$\Delta H_{357} = \Delta H_{298} - 6.758(T_2-T_1) - 0.1405 \times 10^{-3}(T_2^2 - T_1^2)$
$- 0.0973 \times 10^{-6}(T_2^3 - T_1^3)$

$\Delta H_{357} = - 33{,}811$ cal./gm-mole.

4. Heat Generated and Transferred.

Heat generated = (0.77 gm-mole/hr.)(0.3035 conversion)
(33,811 cal./gm-mole)

Heat generated = 8,250 cal./hr. = 32.7 Btu/hr.

Heat transferred by each particle = (32.7 Btu/hr.)/9
= 3.63 Btu/hr.

5. Prandtl Number: (6)

The Prandtl number for gases is relatively constant for small changes in temperature.

$N_{Pr}(\text{Hydrogen}) = 0.73$

$N_{Pr}(\text{Ethylene}) = 0.80$

$N_{Pr}(\text{Ethane}) = 0.77$

$N_{Pr}(\text{Mixture}) = 0.8(0.73) + 0.2(0.80) = 0.744$

6. Heat Capacity (55):

Hydrogen = 6.9 Btu/(lb-mole-°F.)

Ethylene = 11.5 Btu/(lb-mole-°F.)

$C_p$(Mixture) = 0.8(6.9) + 0.2(11.5) = 7.81 Btu/(lb-mole-°F.)

7. Mass Velocity:

Hydrogen = 3.08 gm-mole/hr. = 0.01358 lb./hr.

Ethylene = 0.77 gm-mole/hr. = 0.0475 lb./hr.

Cross-sectional area of reaction tube = $\pi D^2/4$

A = $\pi$(0.1114 ft.)$^2$/4 = 0.00974 ft$^2$.

G = (0.01358+0.0475)/0.00974 = 6.28 lb./(hr.-sq. ft.)

8. Heat Transfer Coefficient:

$h = Q/(a_p \Delta T)$

$a_p = 5.10 \times 10^{-4}$ ft$^2$.

$\Delta T$ = 357 - 208 = 149°F.

h = 3.63/((0.000510)(149)) = 43.0 Btu/(hr.-sq. ft.-°F.)

9. j-Factor:

$j_h = (h/C_p G)(N_{Pr})^{2/3}$

1 lb.-mole ≡ 7.23 lb.

$j_h = (43.0/((7.8)(6.28))(7.23)(0.744)^{2/3} = 5.28$

10. Viscosity (56,61):

The viscosity for the Reynolds number is evaluated at the arithmetic average film temperature, that is, the average of the catalyst surface temperature and the average bulk gas temperature.

$T_f$ = 0.5(357 + 208) = 282.5°F.

$\mu$ (Hydrogen) = $0.00208(T/33.3)^{0.65}$ (56)

T = °K.

$\mu$ (Hydrogen) = 0.01165 cp.

$$\mu \text{ (Ethylene)} = 0.001(2.468 + 0.00975T + 0.00007859T^2 - 0.00000008462T^3) \quad (1)$$

$T = °F.$

$\mu$ (Ethylene) = 0.0134 cp.

$\mu$ (Mixture) = 0.8(0.01165) + 0.2(0.0134)

= 0.0120 cp. = 0.0290 lb./(ft.-hr.)

11. Reynolds number:

$N_{Re} = DG/\mu\emptyset$

$N_{Re} = (0.0101)(6.98)/(0.0290)(0.91) = 2.67$

# APPENDIX B

## COMPUTER CALCULATION PROGRAM

## APPENDIX B

## COMPUTER CALCULATION PROGRAM

Because of the large amount of time involved in the calculation of the j-factors and Reynolds numbers, a Fortran program was developed for the IBM 1620 Digital Computer. The block diagram appears on pages 43 and 44 followed by a description of the terms used and a listing of the program.

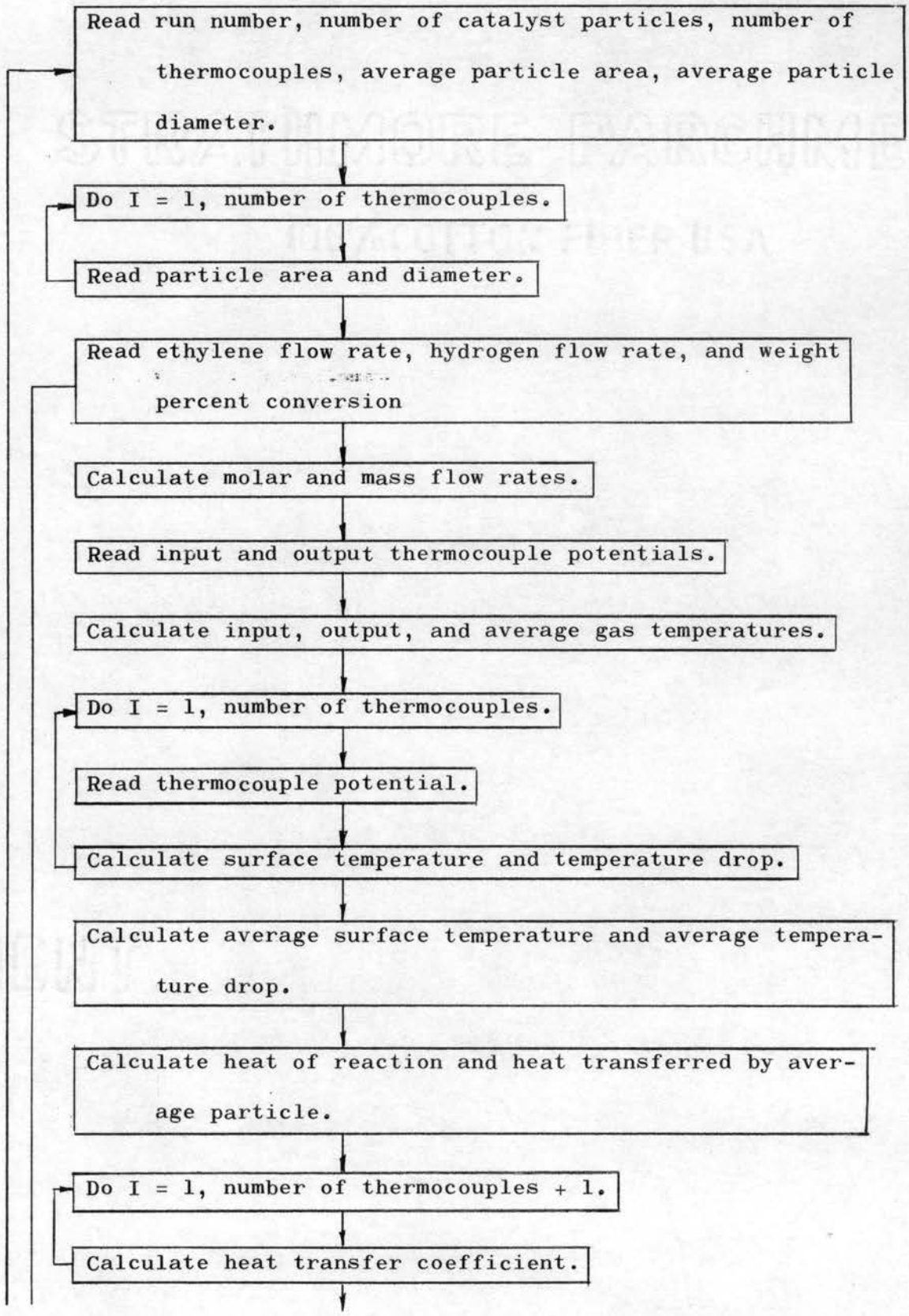
The format given below must be used for input data for the program:

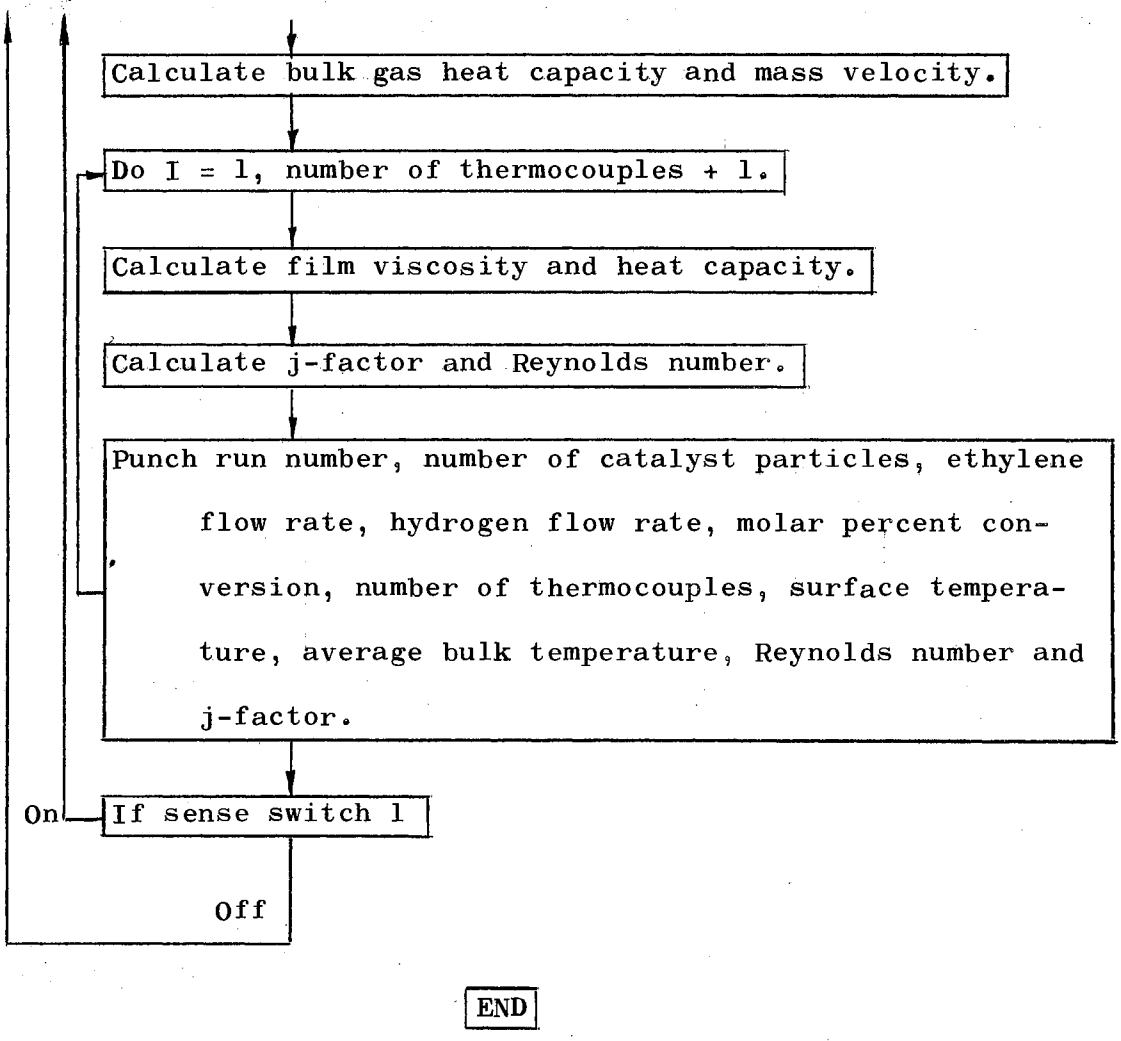
| Number of Cards | CC | Format | Data | Units |
|---|---|---|---|---|
| 1 | 1-4 | I4 | Run number | |
| | 5-8 | I4 | Number of Catalyst particles | |
| | 9-12 | I4 | Number of thermocouples | |
| | 13-26 | E14.8 | Average particle area | sq. ft. |
| | 27-40 | E14.8 | Average particle diameter | ft. |
| N | 1-14 | E14.8 | Particle surface area | sq. ft. |
| | 15-28 | E14.8 | Particle diameter | ft. |
| 1 | 1-14 | E14-8 | Ethylene flow rate | cc/sec. |
| | 15-28 | E14.8 | Hydrogen flow rate | cc/sec. |
| | 29-42 | E14.8 | Weight percent conversion | |
| 1 | 1-14 | E14.8 | Input gas thermocouple potential | mv. |

| Number of Cards | CC | Format | Data | Units |
|---|---|---|---|---|
| | 15-28 | E14.8 | Output gas thermocouple potential | mv. |
| N | 1-14 | E14.8 | Catalyst particle thermocouple potential | mv. |

The only abnormal processing instruction was a sense switch setting. If more than one set of flow rates and conversions were taken, sense switch 1 was turned on. This permitted leading more of the last (N+2) cards without reloading the first (N+1) cards.

Block Diagram




Calculate bulk gas heat capacity and mass velocity.
Do I = 1, number of thermocouples + 1.
Calculate film viscosity and heat capacity.
Calculate j-factor and Reynolds number.
Punch run number, number of catalyst particles, ethylene flow rate, hydrogen flow rate, molar percent conversion, number of thermocouples, surface temperature, average bulk temperature, Reynolds number and j-factor.
If sense switch 1
On
Off
END

The following list describes the terms used in this program. The list is arranged as the terms first appear in the program listing.

| Term | Description |
|---|---|
| NRUN | Run number |
| M | Number od catalyst particles in bed |
| N | Number of thermocouples in bed |
| AREAP | Average particle external surface area |
| DPART | Average particle diameter |
| AREA | Particle external surface area |
| D | Particle diameter |
| CCSCE | Ethylene flow rate |
| CCSCH | Hydrogen flow rate |
| CONV | Weight percent conversion |
| CONEE | Term used to calculate molar conversion |
| CONEA | Term used to calculate molar conversion |
| FLHRE | Ethylene molar flow rate |
| PDHRE | Ethylene mass flow rate |
| FLHRH | Hydrogen molar flow rate |
| PDHRH | Hydrogen mass flow rate |
| VBLKI | Input gas thermocouple potential |
| VBLKO | Output gas thermocouple potential |
| TBLKI | Input gas temperature |
| TBLKO | Output gas temperature |
| BLKAV | Average bulk temperature |
| SMDEL | Sum of temperature drops |
| VTC | Catalyst particle thermocouple potential |

| Term | Description |
|---|---|
| TEMTC | Catalyst particle surface temperature |
| DELT | Temperature drop from surface to bulk gas |
| DELAV | Average temperature drop |
| TREAC | Reaction temperature in absolute units |
| A,B,C | Constants used in the calculation of the heat of reaction |
| HREAC | Heat of reaction |
| PHEAT | Average heat transferred by a catalyst particle |
| H | Heat transfer coefficient |
| CONEA | Average surface temperature |
| HAV | Heat transfer coefficient |
| GM | Superficial mass velocity |
| T | Average bulk gas temperature |
| CPH | Hydrogen bulk gas heat capacity |
| CPE | Ethylene bulk gas heat capacity |
| CPB | Bulk gas heat capacity |
| T | Average film temperature |
| CPH | Hydrogen film heat capacity |
| CPE | Ethylene film heat capacity |
| CPFLM | Film heat capacity |
| UH | Film hydrogen viscosity |
| UE | Film ethylene viscosity |
| UFILM | Film viscosity |
| FACTJ | j-factor |
| RE | Reynolds number |

```
      DIMENSION AREA(10),TEMTC(10),VTC(10),DELT(10),D(10),H(10)
    2 READ 100,NRUN,M,N,AREAP,DPART
      J=N+1
      AREA(J)=AREAP
      D(J)=DPART
      DO 200 I=1,N
  200 READ 101,AREA(I),D(I)
    1 READ 102,CCSCE,CCSCH,CONV
      CONEA=CONV/30.068
      CONEE=(100.0-CONV)/28.052
      CONEE=CONEE+CONEA
      CONV=CONEA*100.0/CONEE
      FLHRE=0.1394*CCSCE
      PDHRE=28.052*FLHRE/453.5924
      FLHRH=0.1394*CCSCH
      PDHRH=2.016*FLHRH/453.5924
      READ 104,VBLKI,VBLKO
      TBLKI=39.24818+32.651772*VBLKI
      TBLKO=39.24818+32.651772*VBLKO
      BLKAV=0.5*(TBLKI+TBLKO)
      SMDEL=0.0
      DO 201 I=1,N
      READ 101,VTC(I)
      TEMTC(I)=39.24818+32.651772*VTC(I)
      DELT(I)=TEMTC(I)-BLKAV
  201 SMDEL=SMDEL+DELT(I)
      Z=N
      DELAV=SMDEL/Z
      DELT(J)=DELAV
      TEMTC(J)=BLKAV+DELT(J)
      TREAC=(DELAV+BLKAV+460.2)/1.8
      T1=298.0
      A=6.758*(TREAC-T1)
      B=0.0001405*((TREAC*TREAC)-(T1*T1))
      C=0.0000000973*((TREAC*TREAC*TREAC)-(T1*T1*T1))
      HREAC=-32732.0-A-B-C
      HEAT=-CONV*FLHRE*HREAC/25200.0
      X=M
      PHEAT=HEAT/X
      DO 202 I=1,J
      PHEAT=PHEAT*(DELT(J)/DELAV)
  202 H(I)=PHEAT/(DELT(I)*AREA(I))
      CONEA=BLKAV+DELAV
      HAV=PHEAT/(DELAV*AREAP)
      GM=(PDHRE+PDHRH)/(0.00972)
      T=(BLKAV+460.2)/1.8
      CPH=(6.947-0.000200*T+0.000000481*T**2.0)/2.016
      CPE=(2.830+0.028601*T-0.000008762*T**2.0)/28.052
      CPB=(PDHRH*CPH+PDHRE*CPE)/(PDHRH+PDHRE)
      DO 203 I=1,J
      T=(BLKAV+0.5*DELT(I)+460.2)/1.8
      CPH=(6.947-0.000200*T+0.000000481*T**2.0)/2.016
      CPE=(2.830+0.028601*T-0.000008762*T**2.0)/28.052
```

```
      CPFLM=0.2235*CPH+0.7765*CPE
      UH=0.00208*(T/33.3)**0.65
      UE=0.001*(2.468+0.00975*T+0.00007859*T*T-0.00000008462*T*T*T)
      UFILM=2.4191*(0.8*UH+0.2*UE)
      FACTJ=0.833*(H(I)/(CPB*GM))
      RE=D(I)*GM/(UFILM*0.91)
  203 PUNCH 121,NRUN,M,CCSCE,CCSCH,CONV,N,TEMTC(I),BLKAV,RE,FACTJ
      IF(SENSE SWITCH 1)1,2
  100 FORMAT(I4,I4,I4,E14.8,E14.8)
  101 FORMAT(E14.8,E14.8)
  102 FORMAT(E14.8,E14.8,E14.8)
  104 FORMAT(E14.8,E14.8)
  121 FORMAT(I4,I3,F6.1,F6.1,F7.2,I4,F9.1,F6.1,F8.3,F8.2)
      END
```

# APPENDIX C

# CURVE FIT PROGRAM

## APPENDIX C

### CURVE FIT PROGRAM

A Fortran program was developed for the IBM 1620 Digital Computer to curve fit the experimental data. This program calculated the constants in the equation, $j_h = aN_{Re}^{b}$. The program used the least squares technique explained by Volk (63). It also calculated the percent average deviation of all points as well as the standard deviation.

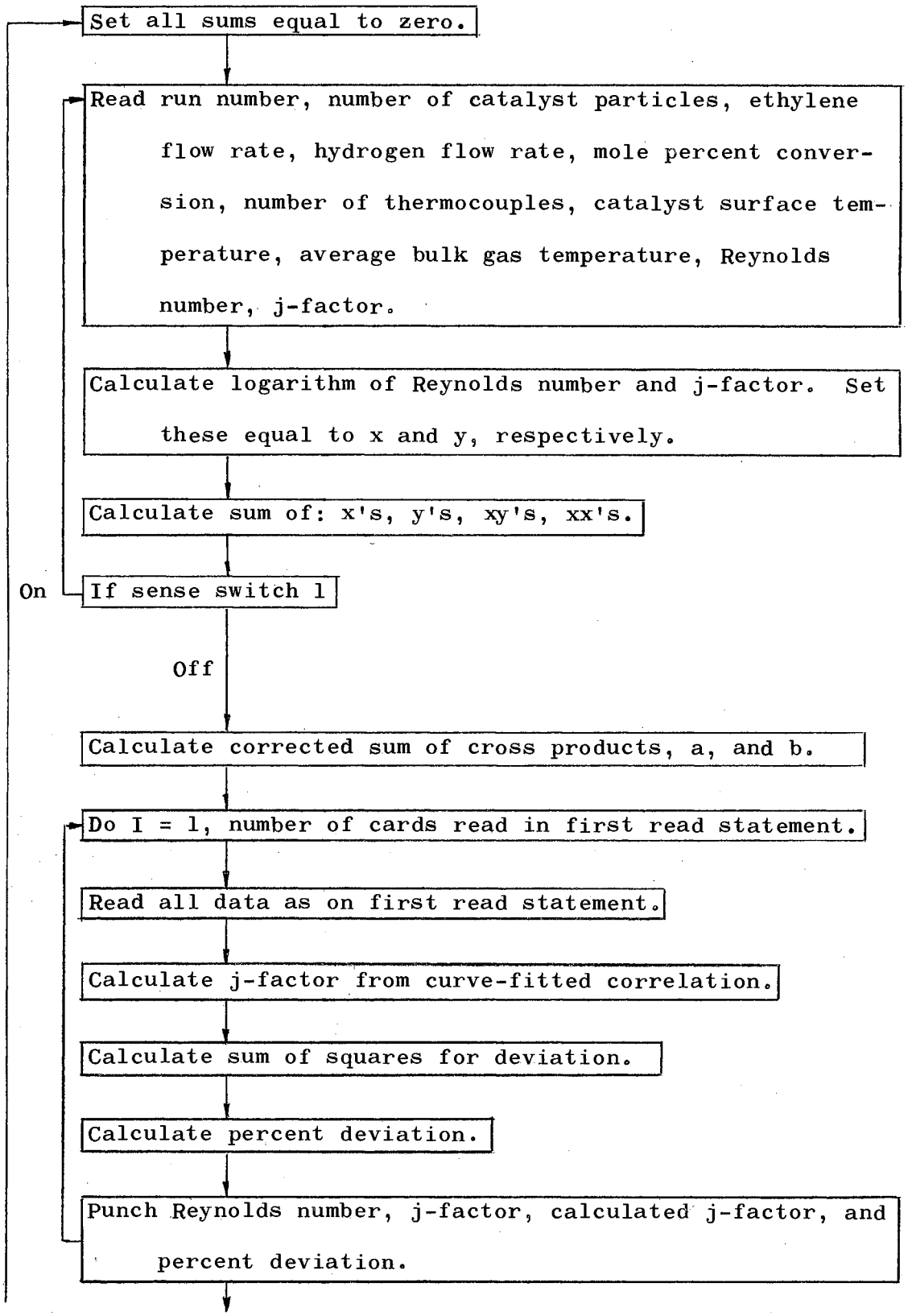
The input data for this program was the output data of the calculation program explained in Appendix B. Below is the definition of terms. The block diagram is on pages 52 and 53, and the program listing is on page 54.

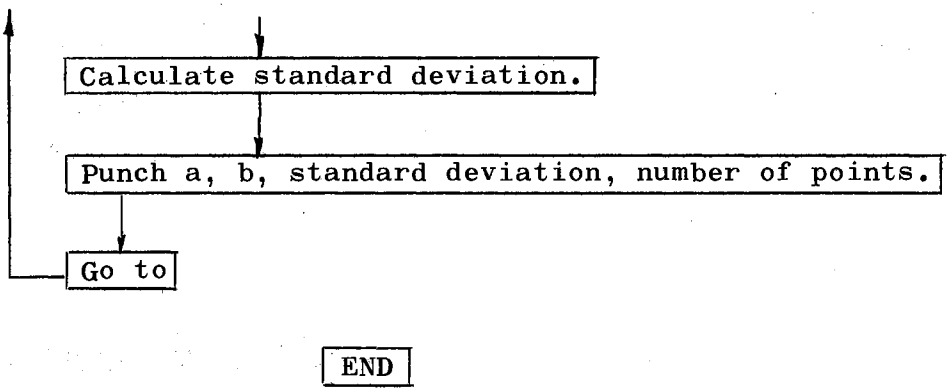
| Term | Description |
|---|---|
| SUMX | Sum of the logarithms of the Reynolds numbers |
| N | Number of data points |
| SUMY | Sum of the Logarithms of the j-factors |
| SUMXY | Sum of the cross products of the logarithms of the Reynolds numbers and the logarithms of the j-factors |
| SUMXS | Sum of squares of the logarithms of the Reynolds numbers |
| SXYB | Corrected cross product sum of squares |
| CCSCE | Ethylene flow rate |
| CCSCH | Hydrogen flow rate |
| NRUN | Run number |
| M | Number of catalyst pellets |
| N | Number of thermocouples |

| Term | Description |
|---|---|
| TEMTC | Catalyst surface temperature |
| BLKAV | Average bulk gas temperature |
| RE | Reynolds number |
| FACTJ | j-factor |
| SUMXS | Corrected sum of squares for the logarithms of the Reynolds numbers |
| B | b in $j_h = aN_{Re}^{b}$ |
| A | a in above equation |
| YCALC | j-factor calculated from above equation |
| SUMSQ | Sum of squares for deviation |
| PCDEV | Percent deviation of a data point from calculate equation |
| SEE | Standard deviation |

It is necessary to have sense switch 1 in the On position until the last card is to be read. At that time the sense switch must be moved to the Off position, and all input cards reloaded into the read hopper.

Block Diagram




Calculate standard deviation.
Punch a, b, standard deviation, number of points.
Go to

END

```
  3  SUMX=0.0
     N=0
     SUMY=0.0
     SUMXY=0.0
     SUMXS=0.0
     SXYB=0.0
     SUMSQ=0.0
     SMPCT=0.0
  1  READ 121, CCSCE,CCSCH,FACTJ,REN,BLKAV,TEMTC,DELT,I,NRUN
     N=N+1
     SUMX=SUMX+LOGF(REN)
     SUMY=SUMY+LOGF(FACTJ)
     SUMXY=SUMXY+(LOGF(FACTJ)*LOGF(REN))
     SUMXS=SUMXS+(LOGF(REN)*LOGF(REN))
     IF(SENSE SWITCH 1)1,2
  2  Z=N
     SXYB=SUMXY-(SUMX*SUMY)/Z
     SUMXS=SUMXS-(SUMX*SUMX)/Z
     B=SXYB/SUMXS
     A=SUMY/Z-B*(SUMX/Z)
     A=EXPF(A)
     DO 200 K=1,N
     READ 121, CCSCE,CCSCH,FACTJ,REN,BLKAV,TEMTC,DELT,I,NRUN
     YCALC=A*(REN**B)
     SUMSQ=(YCALC-FACTJ)**2+SUMSQ
     PCDEV=100.0*((YCALC-FACTJ)/YCALC)
     SMPCT=SMPCT+ABSF(PCDEV)
200  CONTINUE
     SEE=(SUMSQ/(Z-2.0))**0.5
     PUNCH 103
     PUNCH 105,A,B
     PUNCH 102, SEE,N
     PCTAV=SMPCT/Z
     PUNCH 106, PCTAV
     GO TO 3
102  FORMAT(4HSEE=,F8.3,10X,10HNO OF PTS=,I5)
103  FORMAT(//)
105  FORMAT(2HA=,F8.4,6X,2HB=,F8.4//)
106  FORMAT(/17HPER CENT AVE DEV=,F8.3////)
121  FORMAT(I4,I3,F6.1,F6.1,F7.2,I4,F9.1,F6.1,F8.3,F8.2)
     END
```

# APPENDIX D

# EXPERIMENTAL DATA

# APPENDIX D

## EXPERIMENTAL DATA

The output from the program explained in Appendix A appears on pages 57 through 98.

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 131 | 9 | .5 | 2.0 | 78.24 | 4 | 256.0 | 207.0 | .242 | 42.20 |
| 131 | 9 | .5 | 2.0 | 78.24 | 4 | 245.0 | 207.0 | .263 | 54.03 |
| 131 | 9 | .5 | 2.0 | 78.24 | 4 | 248.4 | 207.0 | .244 | 53.14 |
| 131 | 9 | .5 | 2.0 | 78.24 | 4 | 227.8 | 207.0 | .264 | 105.00 |
| 131 | 9 | .5 | 2.0 | 78.24 | 4 | 244.3 | 207.0 | .254 | 55.16 |
| 131 | 9 | .5 | 2.0 | 78.24 | 4 | 254.8 | 205.6 | .243 | 42.05 |
| 131 | 9 | .5 | 2.0 | 78.24 | 4 | 243.7 | 205.6 | .264 | 53.88 |
| 131 | 9 | .5 | 2.0 | 78.24 | 4 | 246.7 | 205.6 | .245 | 53.56 |
| 131 | 9 | .5 | 2.0 | 78.24 | 4 | 226.8 | 205.6 | .265 | 102.69 |
| 131 | 9 | .5 | 2.0 | 78.24 | 4 | 243.0 | 205.6 | .254 | 55.01 |
| 131 | 9 | .5 | 2.0 | 78.24 | 4 | 254.9 | 205.5 | .243 | 41.89 |
| 131 | 9 | .5 | 2.0 | 78.24 | 4 | 243.6 | 205.5 | .264 | 53.84 |
| 131 | 9 | .5 | 2.0 | 78.24 | 4 | 247.1 | 205.5 | .244 | 52.89 |
| 131 | 9 | .5 | 2.0 | 78.24 | 4 | 226.5 | 205.5 | .265 | 103.97 |
| 131 | 9 | .5 | 2.0 | 78.24 | 4 | 243.0 | 205.5 | .254 | 54.83 |
| 131 | 9 | 1.0 | 4.0 | 59.13 | 4 | 279.1 | 205.3 | .480 | 21.26 |
| 131 | 9 | 1.0 | 4.0 | 59.13 | 4 | 262.2 | 205.3 | .523 | 27.39 |
| 131 | 9 | 1.0 | 4.0 | 59.13 | 4 | 274.9 | 205.3 | .482 | 23.97 |
| 131 | 9 | 1.0 | 4.0 | 59.13 | 4 | 249.1 | 205.3 | .524 | 37.74 |
| 131 | 9 | 1.0 | 4.0 | 59.13 | 4 | 266.3 | 205.3 | .502 | 25.57 |
| 131 | 9 | 1.0 | 4.0 | 59.13 | 4 | 278.9 | 204.5 | .480 | 21.11 |
| 131 | 9 | 1.0 | 4.0 | 59.13 | 4 | 262.0 | 204.5 | .523 | 27.07 |
| 131 | 9 | 1.0 | 4.0 | 59.13 | 4 | 274.6 | 204.5 | .483 | 23.79 |
| 131 | 9 | 1.0 | 4.0 | 59.13 | 4 | 248.4 | 204.5 | .524 | 37.66 |
| 131 | 9 | 1.0 | 4.0 | 59.13 | 4 | 266.0 | 204.5 | .503 | 25.38 |
| 131 | 9 | 1.5 | 6.0 | 50.46 | 4 | 294.7 | 204.3 | .715 | 14.85 |
| 131 | 9 | 1.5 | 6.0 | 50.46 | 4 | 274.4 | 204.3 | .780 | 19.01 |
| 131 | 9 | 1.5 | 6.0 | 50.46 | 4 | 294.0 | 204.3 | .717 | 15.89 |
| 131 | 9 | 1.5 | 6.0 | 50.46 | 4 | 265.1 | 204.3 | .780 | 23.28 |
| 131 | 9 | 1.5 | 6.0 | 50.46 | 4 | 282.0 | 204.3 | .748 | 17.17 |
| 131 | 9 | 1.5 | 6.0 | 50.46 | 4 | 294.3 | 203.8 | .715 | 14.82 |
| 131 | 9 | 1.5 | 6.0 | 50.46 | 4 | 273.8 | 203.8 | .781 | 19.01 |
| 131 | 9 | 1.5 | 6.0 | 50.46 | 4 | 293.3 | 203.8 | .718 | 15.92 |
| 131 | 9 | 1.5 | 6.0 | 50.46 | 4 | 265.0 | 203.8 | .780 | 23.08 |
| 131 | 9 | 1.5 | 6.0 | 50.46 | 4 | 281.6 | 203.8 | .748 | 17.13 |
| 131 | 9 | 2.0 | 8.0 | 44.28 | 4 | 309.3 | 206.6 | .945 | 11.48 |
| 131 | 9 | 2.0 | 8.0 | 44.28 | 4 | 286.8 | 206.6 | 1.033 | 14.58 |
| 131 | 9 | 2.0 | 8.0 | 44.28 | 4 | 310.6 | 206.6 | .947 | 12.04 |
| 131 | 9 | 2.0 | 8.0 | 44.28 | 4 | 281.1 | 206.6 | 1.030 | 16.67 |
| 131 | 9 | 2.0 | 8.0 | 44.28 | 4 | 296.9 | 206.6 | .989 | 12.97 |
| 131 | 9 | 2.0 | 8.0 | 44.28 | 4 | 309.1 | 206.3 | .945 | 11.46 |
| 131 | 9 | 2.0 | 8.0 | 44.28 | 4 | 286.6 | 206.3 | 1.033 | 14.55 |
| 131 | 9 | 2.0 | 8.0 | 44.28 | 4 | 311.0 | 206.3 | .947 | 11.95 |
| 131 | 9 | 2.0 | 8.0 | 44.28 | 4 | 280.4 | 206.3 | 1.031 | 16.76 |
| 131 | 9 | 2.0 | 8.0 | 44.28 | 4 | 296.8 | 206.3 | .989 | 12.95 |
| 131 | 9 | 2.5 | 10.0 | 40.81 | 4 | 318.9 | 206.1 | 1.176 | 9.64 |
| 131 | 9 | 2.5 | 10.0 | 40.81 | 4 | 295.4 | 206.1 | 1.286 | 12.09 |
| 131 | 9 | 2.5 | 10.0 | 40.81 | 4 | 324.7 | 206.1 | 1.176 | 9.74 |
| 131 | 9 | 2.5 | 10.0 | 40.81 | 4 | 291.1 | 206.1 | 1.282 | 13.48 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 131 | 9 | 2.5 | 10.0 | 40.81 | 4 | 307.5 | 206.1 | 1.230 | 10.66 |
| 131 | 9 | 2.5 | 10.0 | 40.81 | 4 | 318.9 | 206.3 | 1.176 | 9.66 |
| 131 | 9 | 2.5 | 10.0 | 40.81 | 4 | 295.2 | 206.3 | 1.286 | 12.15 |
| 131 | 9 | 2.5 | 10.0 | 40.81 | 4 | 324.3 | 206.3 | 1.176 | 9.79 |
| 131 | 9 | 2.5 | 10.0 | 40.81 | 4 | 291.1 | 206.3 | 1.281 | 13.51 |
| 131 | 9 | 2.5 | 10.0 | 40.81 | 4 | 307.4 | 206.3 | 1.230 | 10.70 |
| 131 | 9 | 3.0 | 12.0 | 36.87 | 4 | 325.0 | 206.7 | 1.407 | 8.30 |
| 131 | 9 | 3.0 | 12.0 | 36.87 | 4 | 300.4 | 206.7 | 1.539 | 10.40 |
| 131 | 9 | 3.0 | 12.0 | 36.87 | 4 | 333.7 | 206.7 | 1.405 | 8.21 |
| 131 | 9 | 3.0 | 12.0 | 36.87 | 4 | 298.0 | 206.7 | 1.532 | 11.34 |
| 131 | 9 | 3.0 | 12.0 | 36.87 | 4 | 314.3 | 206.7 | 1.470 | 9.08 |
| 131 | 9 | 3.0 | 12.0 | 36.87 | 4 | 325.6 | 206.6 | 1.406 | 8.26 |
| 131 | 9 | 3.0 | 12.0 | 36.87 | 4 | 301.0 | 206.6 | 1.538 | 10.33 |
| 131 | 9 | 3.0 | 12.0 | 36.87 | 4 | 333.9 | 206.6 | 1.405 | 8.20 |
| 131 | 9 | 3.0 | 12.0 | 36.87 | 4 | 298.6 | 206.6 | 1.532 | 11.25 |
| 131 | 9 | 3.0 | 12.0 | 36.87 | 4 | 314.8 | 206.6 | 1.470 | 9.03 |
| 131 | 9 | 3.5 | 14.0 | 35.20 | 4 | 336.4 | 207.0 | 1.632 | 7.26 |
| 131 | 9 | 3.5 | 14.0 | 35.20 | 4 | 310.7 | 207.0 | 1.786 | 8.99 |
| 131 | 9 | 3.5 | 14.0 | 35.20 | 4 | 349.9 | 207.0 | 1.626 | 6.98 |
| 131 | 9 | 3.5 | 14.0 | 35.20 | 4 | 310.4 | 207.0 | 1.776 | 9.58 |
| 131 | 9 | 3.5 | 14.0 | 35.20 | 4 | 326.8 | 207.0 | 1.705 | 7.79 |
| 131 | 9 | 3.5 | 14.0 | 35.20 | 4 | 336.4 | 206.7 | 1.632 | 7.24 |
| 131 | 9 | 3.5 | 14.0 | 35.20 | 4 | 310.4 | 206.7 | 1.786 | 8.99 |
| 131 | 9 | 3.5 | 14.0 | 35.20 | 4 | 348.3 | 206.7 | 1.627 | 7.05 |
| 131 | 9 | 3.5 | 14.0 | 35.20 | 4 | 309.2 | 206.7 | 1.777 | 9.66 |
| 131 | 9 | 3.5 | 14.0 | 35.20 | 4 | 326.1 | 206.7 | 1.706 | 7.82 |
| 131 | 9 | 4.0 | 16.0 | 32.85 | 4 | 345.8 | 206.9 | 1.857 | 6.32 |
| 131 | 9 | 4.0 | 16.0 | 32.85 | 4 | 319.0 | 206.9 | 2.032 | 7.77 |
| 131 | 9 | 4.0 | 16.0 | 32.85 | 4 | 360.4 | 206.9 | 1.849 | 6.08 |
| 131 | 9 | 4.0 | 16.0 | 32.85 | 4 | 318.7 | 206.9 | 2.022 | 8.27 |
| 131 | 9 | 4.0 | 16.0 | 32.85 | 4 | 336.0 | 206.9 | 1.940 | 6.76 |
| 131 | 9 | 4.0 | 16.0 | 32.85 | 4 | 346.1 | 207.0 | 1.856 | 6.31 |
| 131 | 9 | 4.0 | 16.0 | 32.85 | 4 | 319.3 | 207.0 | 2.032 | 7.75 |
| 131 | 9 | 4.0 | 16.0 | 32.85 | 4 | 360.7 | 207.0 | 1.849 | 6.06 |
| 131 | 9 | 4.0 | 16.0 | 32.85 | 4 | 319.2 | 207.0 | 2.021 | 8.24 |
| 131 | 9 | 4.0 | 16.0 | 32.85 | 4 | 336.3 | 207.0 | 1.939 | 6.75 |
| 131 | 9 | 4.5 | 18.0 | 32.85 | 4 | 352.9 | 207.0 | 2.081 | 6.02 |
| 131 | 9 | 4.5 | 18.0 | 32.85 | 4 | 324.6 | 207.0 | 2.280 | 7.41 |
| 131 | 9 | 4.5 | 18.0 | 32.85 | 4 | 367.6 | 207.0 | 2.073 | 5.81 |
| 131 | 9 | 4.5 | 18.0 | 32.85 | 4 | 325.3 | 207.0 | 2.267 | 7.82 |
| 131 | 9 | 4.5 | 18.0 | 32.85 | 4 | 342.6 | 207.0 | 2.175 | 6.44 |
| 131 | 9 | 4.5 | 18.0 | 32.85 | 4 | 353.6 | 207.0 | 2.081 | 5.99 |
| 131 | 9 | 4.5 | 18.0 | 32.85 | 4 | 325.9 | 207.0 | 2.279 | 7.33 |
| 131 | 9 | 4.5 | 18.0 | 32.85 | 4 | 369.6 | 207.0 | 2.071 | 5.74 |
| 131 | 9 | 4.5 | 18.0 | 32.85 | 4 | 326.6 | 207.0 | 2.265 | 7.74 |
| 131 | 9 | 4.5 | 18.0 | 32.85 | 4 | 343.9 | 207.0 | 2.173 | 6.38 |
| 131 | 9 | 5.0 | 20.0 | 30.50 | 4 | 359.4 | 207.5 | 2.305 | 5.37 |
| 131 | 9 | 5.0 | 20.0 | 30.50 | 4 | 331.6 | 207.5 | 2.524 | 6.52 |
| 131 | 9 | 5.0 | 20.0 | 30.50 | 4 | 377.9 | 207.5 | 2.291 | 5.08 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 131 | 9 | 5.0 | 20.0 | 30.50 | 4 | 331.3 | 207.5 | 2.511 | 6.95 |
| 131 | 9 | 5.0 | 20.0 | 30.50 | 4 | 350.0 | 207.5 | 2.407 | 5.69 |
| 131 | 9 | 5.0 | 20.0 | 30.50 | 4 | 360.3 | 208.0 | 2.303 | 5.36 |
| 131 | 9 | 5.0 | 20.0 | 30.50 | 4 | 331.8 | 208.0 | 2.523 | 6.54 |
| 131 | 9 | 5.0 | 20.0 | 30.50 | 4 | 378.9 | 208.0 | 2.290 | 5.07 |
| 131 | 9 | 5.0 | 20.0 | 30.50 | 4 | 332.1 | 208.0 | 2.509 | 6.93 |
| 131 | 9 | 5.0 | 20.0 | 30.50 | 4 | 350.8 | 208.0 | 2.406 | 5.68 |
| 131 | 9 | 5.5 | 22.0 | 28.85 | 4 | 367.5 | 208.5 | 2.524 | 4.86 |
| 131 | 9 | 5.5 | 22.0 | 28.85 | 4 | 338.6 | 208.5 | 2.766 | 5.89 |
| 131 | 9 | 5.5 | 22.0 | 28.85 | 4 | 385.6 | 208.5 | 2.510 | 4.63 |
| 131 | 9 | 5.5 | 22.0 | 28.85 | 4 | 337.3 | 208.5 | 2.752 | 6.32 |
| 131 | 9 | 5.5 | 22.0 | 28.85 | 4 | 357.3 | 208.5 | 2.637 | 5.16 |
| 131 | 9 | 5.5 | 22.0 | 28.85 | 4 | 367.4 | 208.8 | 2.524 | 4.87 |
| 131 | 9 | 5.5 | 22.0 | 28.85 | 4 | 339.1 | 208.8 | 2.765 | 5.88 |
| 131 | 9 | 5.5 | 22.0 | 28.85 | 4 | 385.6 | 208.8 | 2.510 | 4.64 |
| 131 | 9 | 5.5 | 22.0 | 28.85 | 4 | 338.2 | 208.8 | 2.751 | 6.28 |
| 131 | 9 | 5.5 | 22.0 | 28.85 | 4 | 357.6 | 208.8 | 2.637 | 5.16 |
| 132 | 9 | .5 | 2.0 | 78.03 | 4 | 256.0 | 207.0 | .242 | 42.08 |
| 132 | 9 | .5 | 2.0 | 78.03 | 4 | 245.0 | 207.0 | .263 | 53.88 |
| 132 | 9 | .5 | 2.0 | 78.03 | 4 | 248.4 | 207.0 | .244 | 53.00 |
| 132 | 9 | .5 | 2.0 | 78.03 | 4 | 227.8 | 207.0 | .264 | 104.72 |
| 132 | 9 | .5 | 2.0 | 78.03 | 4 | 244.3 | 207.0 | .254 | 55.02 |
| 132 | 9 | .5 | 2.0 | 78.03 | 4 | 254.8 | 205.6 | .243 | 41.94 |
| 132 | 9 | .5 | 2.0 | 78.03 | 4 | 243.7 | 205.6 | .264 | 53.74 |
| 132 | 9 | .5 | 2.0 | 78.03 | 4 | 246.7 | 205.6 | .245 | 53.42 |
| 132 | 9 | .5 | 2.0 | 78.03 | 4 | 226.8 | 205.6 | .265 | 102.42 |
| 132 | 9 | .5 | 2.0 | 78.03 | 4 | 243.0 | 205.6 | .254 | 54.86 |
| 132 | 9 | .5 | 2.0 | 78.03 | 4 | 254.9 | 205.5 | .243 | 41.78 |
| 132 | 9 | .5 | 2.0 | 78.03 | 4 | 243.6 | 205.5 | .264 | 53.69 |
| 132 | 9 | .5 | 2.0 | 78.03 | 4 | 247.1 | 205.5 | .244 | 52.75 |
| 132 | 9 | .5 | 2.0 | 78.03 | 4 | 226.5 | 205.5 | .265 | 103.70 |
| 132 | 9 | .5 | 2.0 | 78.03 | 4 | 243.0 | 205.5 | .254 | 54.69 |
| 132 | 9 | 1.0 | 4.0 | 59.53 | 4 | 279.1 | 205.3 | .480 | 21.41 |
| 132 | 9 | 1.0 | 4.0 | 59.53 | 4 | 262.2 | 205.3 | .523 | 27.58 |
| 132 | 9 | 1.0 | 4.0 | 59.53 | 4 | 274.9 | 205.3 | .482 | 24.13 |
| 132 | 9 | 1.0 | 4.0 | 59.53 | 4 | 249.1 | 205.3 | .524 | 37.99 |
| 132 | 9 | 1.0 | 4.0 | 59.53 | 4 | 266.3 | 205.3 | .502 | 25.75 |
| 132 | 9 | 1.0 | 4.0 | 59.53 | 4 | 278.9 | 204.5 | .480 | 21.25 |
| 132 | 9 | 1.0 | 4.0 | 59.53 | 4 | 262.0 | 204.5 | .523 | 27.25 |
| 132 | 9 | 1.0 | 4.0 | 59.53 | 4 | 274.6 | 204.5 | .483 | 23.96 |
| 132 | 9 | 1.0 | 4.0 | 59.53 | 4 | 248.4 | 204.5 | .524 | 37.92 |
| 132 | 9 | 1.0 | 4.0 | 59.53 | 4 | 266.0 | 204.5 | .503 | 25.56 |
| 132 | 9 | 1.5 | 6.0 | 52.37 | 4 | 294.7 | 204.3 | .715 | 15.41 |
| 132 | 9 | 1.5 | 6.0 | 52.37 | 4 | 274.4 | 204.3 | .780 | 19.73 |
| 132 | 9 | 1.5 | 6.0 | 52.37 | 4 | 294.0 | 204.3 | .717 | 16.49 |
| 132 | 9 | 1.5 | 6.0 | 52.37 | 4 | 265.1 | 204.3 | .780 | 24.16 |
| 132 | 9 | 1.5 | 6.0 | 52.37 | 4 | 282.0 | 204.3 | .748 | 17.82 |
| 132 | 9 | 1.5 | 6.0 | 52.37 | 4 | 294.3 | 203.8 | .715 | 15.38 |
| 132 | 9 | 1.5 | 6.0 | 52.37 | 4 | 273.8 | 203.8 | .781 | 19.73 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 132 | 9 | 1.5 | 6.0 | 52.37 | 4 | 293.3 | 203.8 | .718 | 16.52 |
| 132 | 9 | 1.5 | 6.0 | 52.37 | 4 | 265.0 | 203.8 | .780 | 23.95 |
| 132 | 9 | 1.5 | 6.0 | 52.37 | 4 | 281.6 | 203.8 | .748 | 17.78 |
| 132 | 9 | 2.0 | 8.0 | 44.77 | 4 | 309.3 | 206.6 | .945 | 11.61 |
| 132 | 9 | 2.0 | 8.0 | 44.77 | 4 | 286.8 | 206.6 | 1.033 | 14.74 |
| 132 | 9 | 2.0 | 8.0 | 44.77 | 4 | 310.6 | 206.6 | .947 | 12.18 |
| 132 | 9 | 2.0 | 8.0 | 44.77 | 4 | 281.1 | 206.6 | 1.030 | 16.85 |
| 132 | 9 | 2.0 | 8.0 | 44.77 | 4 | 296.9 | 206.6 | .989 | 13.12 |
| 132 | 9 | 2.0 | 8.0 | 44.77 | 4 | 309.1 | 206.3 | .945 | 11.59 |
| 132 | 9 | 2.0 | 8.0 | 44.77 | 4 | 286.6 | 206.3 | 1.033 | 14.72 |
| 132 | 9 | 2.0 | 8.0 | 44.77 | 4 | 311.0 | 206.3 | .947 | 12.09 |
| 132 | 9 | 2.0 | 8.0 | 44.77 | 4 | 280.4 | 206.3 | 1.031 | 16.95 |
| 132 | 9 | 2.0 | 8.0 | 44.77 | 4 | 296.8 | 206.3 | .989 | 13.09 |
| 132 | 9 | 2.5 | 10.0 | 40.12 | 4 | 318.9 | 206.1 | 1.176 | 9.48 |
| 132 | 9 | 2.5 | 10.0 | 40.12 | 4 | 295.4 | 206.1 | 1.286 | 11.88 |
| 132 | 9 | 2.5 | 10.0 | 40.12 | 4 | 324.7 | 206.1 | 1.176 | 9.57 |
| 132 | 9 | 2.5 | 10.0 | 40.12 | 4 | 291.1 | 206.1 | 1.282 | 13.25 |
| 132 | 9 | 2.5 | 10.0 | 40.12 | 4 | 307.5 | 206.1 | 1.230 | 10.48 |
| 132 | 9 | 2.5 | 10.0 | 40.12 | 4 | 318.9 | 206.3 | 1.176 | 9.49 |
| 132 | 9 | 2.5 | 10.0 | 40.12 | 4 | 295.2 | 206.3 | 1.286 | 11.94 |
| 132 | 9 | 2.5 | 10.0 | 40.12 | 4 | 324.3 | 206.3 | 1.176 | 9.63 |
| 132 | 9 | 2.5 | 10.0 | 40.12 | 4 | 291.1 | 206.3 | 1.281 | 13.28 |
| 132 | 9 | 2.5 | 10.0 | 40.12 | 4 | 307.4 | 206.3 | 1.230 | 10.52 |
| 132 | 9 | 3.0 | 12.0 | 36.96 | 4 | 325.0 | 206.7 | 1.407 | 8.32 |
| 132 | 9 | 3.0 | 12.0 | 36.96 | 4 | 300.4 | 206.7 | 1.539 | 10.43 |
| 132 | 9 | 3.0 | 12.0 | 36.96 | 4 | 333.7 | 206.7 | 1.405 | 8.24 |
| 132 | 9 | 3.0 | 12.0 | 36.96 | 4 | 298.0 | 206.7 | 1.532 | 11.37 |
| 132 | 9 | 3.0 | 12.0 | 36.96 | 4 | 314.3 | 206.7 | 1.470 | 9.10 |
| 132 | 9 | 3.0 | 12.0 | 36.96 | 4 | 325.6 | 206.6 | 1.406 | 8.28 |
| 132 | 9 | 3.0 | 12.0 | 36.96 | 4 | 301.0 | 206.6 | 1.538 | 10.35 |
| 132 | 9 | 3.0 | 12.0 | 36.96 | 4 | 333.9 | 206.6 | 1.405 | 8.22 |
| 132 | 9 | 3.0 | 12.0 | 36.96 | 4 | 298.6 | 206.6 | 1.532 | 11.28 |
| 132 | 9 | 3.0 | 12.0 | 36.96 | 4 | 314.8 | 206.6 | 1.470 | 9.06 |
| 132 | 9 | 3.5 | 14.0 | 34.51 | 4 | 336.4 | 207.0 | 1.632 | 7.12 |
| 132 | 9 | 3.5 | 14.0 | 34.51 | 4 | 310.7 | 207.0 | 1.786 | 8.82 |
| 132 | 9 | 3.5 | 14.0 | 34.51 | 4 | 349.9 | 207.0 | 1.626 | 6.85 |
| 132 | 9 | 3.5 | 14.0 | 34.51 | 4 | 310.4 | 207.0 | 1.776 | 9.39 |
| 132 | 9 | 3.5 | 14.0 | 34.51 | 4 | 326.8 | 207.0 | 1.705 | 7.64 |
| 132 | 9 | 3.5 | 14.0 | 34.51 | 4 | 336.4 | 206.7 | 1.632 | 7.10 |
| 132 | 9 | 3.5 | 14.0 | 34.51 | 4 | 310.4 | 206.7 | 1.786 | 8.82 |
| 132 | 9 | 3.5 | 14.0 | 34.51 | 4 | 348.3 | 206.7 | 1.627 | 6.91 |
| 132 | 9 | 3.5 | 14.0 | 34.51 | 4 | 309.2 | 206.7 | 1.777 | 9.47 |
| 132 | 9 | 3.5 | 14.0 | 34.51 | 4 | 326.1 | 206.7 | 1.706 | 7.67 |
| 132 | 9 | 4.0 | 16.0 | 33.24 | 4 | 345.8 | 206.9 | 1.857 | 6.39 |
| 132 | 9 | 4.0 | 16.0 | 33.24 | 4 | 319.0 | 206.9 | 2.032 | 7.86 |
| 132 | 9 | 4.0 | 16.0 | 33.24 | 4 | 360.4 | 206.9 | 1.849 | 6.15 |
| 132 | 9 | 4.0 | 16.0 | 33.24 | 4 | 318.7 | 206.9 | 2.022 | 8.37 |
| 132 | 9 | 4.0 | 16.0 | 33.24 | 4 | 336.0 | 206.9 | 1.940 | 6.84 |
| 132 | 9 | 4.0 | 16.0 | 33.24 | 4 | 346.1 | 207.0 | 1.856 | 6.38 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 132 | 9 | 4.0 | 16.0 | 33.24 | 4 | 319.3 | 207.0 | 2.032 | 7.85 |
| 132 | 9 | 4.0 | 16.0 | 33.24 | 4 | 360.7 | 207.0 | 1.849 | 6.14 |
| 132 | 9 | 4.0 | 16.0 | 33.24 | 4 | 319.2 | 207.0 | 2.021 | 8.34 |
| 132 | 9 | 4.0 | 16.0 | 33.24 | 4 | 336.3 | 207.0 | 1.939 | 6.83 |
| 132 | 9 | 4.5 | 18.0 | 31.67 | 4 | 352.9 | 207.0 | 2.081 | 5.80 |
| 132 | 9 | 4.5 | 18.0 | 31.67 | 4 | 324.6 | 207.0 | 2.280 | 7.14 |
| 132 | 9 | 4.5 | 18.0 | 31.67 | 4 | 367.6 | 207.0 | 2.073 | 5.60 |
| 132 | 9 | 4.5 | 18.0 | 31.67 | 4 | 325.3 | 207.0 | 2.267 | 7.54 |
| 132 | 9 | 4.5 | 18.0 | 31.67 | 4 | 342.6 | 207.0 | 2.175 | 6.21 |
| 132 | 9 | 4.5 | 18.0 | 31.67 | 4 | 353.6 | 207.0 | 2.081 | 5.78 |
| 132 | 9 | 4.5 | 18.0 | 31.67 | 4 | 325.9 | 207.0 | 2.279 | 7.07 |
| 132 | 9 | 4.5 | 18.0 | 31.67 | 4 | 369.6 | 207.0 | 2.071 | 5.53 |
| 132 | 9 | 4.5 | 18.0 | 31.67 | 4 | 326.6 | 207.0 | 2.265 | 7.46 |
| 132 | 9 | 4.5 | 18.0 | 31.67 | 4 | 343.9 | 207.0 | 2.173 | 6.15 |
| 132 | 9 | 5.0 | 20.0 | 30.31 | 4 | 359.4 | 207.5 | 2.305 | 5.34 |
| 132 | 9 | 5.0 | 20.0 | 30.31 | 4 | 331.6 | 207.5 | 2.524 | 6.48 |
| 132 | 9 | 5.0 | 20.0 | 30.31 | 4 | 377.9 | 207.5 | 2.291 | 5.05 |
| 132 | 9 | 5.0 | 20.0 | 30.31 | 4 | 331.3 | 207.5 | 2.511 | 6.90 |
| 132 | 9 | 5.0 | 20.0 | 30.31 | 4 | 350.0 | 207.5 | 2.407 | 5.65 |
| 132 | 9 | 5.0 | 20.0 | 30.31 | 4 | 360.3 | 208.0 | 2.303 | 5.33 |
| 132 | 9 | 5.0 | 20.0 | 30.31 | 4 | 331.8 | 208.0 | 2.523 | 6.50 |
| 132 | 9 | 5.0 | 20.0 | 30.31 | 4 | 378.9 | 208.0 | 2.290 | 5.04 |
| 132 | 9 | 5.0 | 20.0 | 30.31 | 4 | 332.1 | 208.0 | 2.509 | 6.88 |
| 132 | 9 | 5.0 | 20.0 | 30.31 | 4 | 350.8 | 208.0 | 2.406 | 5.65 |
| 132 | 9 | 5.5 | 22.0 | 29.14 | 4 | 367.5 | 208.5 | 2.524 | 4.90 |
| 132 | 9 | 5.5 | 22.0 | 29.14 | 4 | 338.6 | 208.5 | 2.766 | 5.95 |
| 132 | 9 | 5.5 | 22.0 | 29.14 | 4 | 385.6 | 208.5 | 2.510 | 4.68 |
| 132 | 9 | 5.5 | 22.0 | 29.14 | 4 | 337.3 | 208.5 | 2.752 | 6.38 |
| 132 | 9 | 5.5 | 22.0 | 29.14 | 4 | 357.3 | 208.5 | 2.637 | 5.21 |
| 132 | 9 | 5.5 | 22.0 | 29.14 | 4 | 367.4 | 208.8 | 2.524 | 4.92 |
| 132 | 9 | 5.5 | 22.0 | 29.14 | 4 | 339.1 | 208.8 | 2.765 | 5.94 |
| 132 | 9 | 5.5 | 22.0 | 29.14 | 4 | 385.6 | 208.8 | 2.510 | 4.68 |
| 132 | 9 | 5.5 | 22.0 | 29.14 | 4 | 338.2 | 208.8 | 2.751 | 6.35 |
| 132 | 9 | 5.5 | 22.0 | 29.14 | 4 | 357.6 | 208.8 | 2.637 | 5.21 |
| 133 | 9 | .5 | 2.0 | 78.13 | 4 | 256.0 | 207.0 | .242 | 42.14 |
| 133 | 9 | .5 | 2.0 | 78.13 | 4 | 245.0 | 207.0 | .263 | 53.95 |
| 133 | 9 | .5 | 2.0 | 78.13 | 4 | 248.4 | 207.0 | .244 | 53.07 |
| 133 | 9 | .5 | 2.0 | 78.13 | 4 | 227.8 | 207.0 | .264 | 104.86 |
| 133 | 9 | .5 | 2.0 | 78.13 | 4 | 244.3 | 207.0 | .254 | 55.09 |
| 133 | 9 | .5 | 2.0 | 78.13 | 4 | 254.8 | 205.6 | .243 | 42.00 |
| 133 | 9 | .5 | 2.0 | 78.13 | 4 | 243.7 | 205.6 | .264 | 53.81 |
| 133 | 9 | .5 | 2.0 | 78.13 | 4 | 246.7 | 205.6 | .245 | 53.49 |
| 133 | 9 | .5 | 2.0 | 78.13 | 4 | 226.8 | 205.6 | .265 | 102.55 |
| 133 | 9 | .5 | 2.0 | 78.13 | 4 | 243.0 | 205.6 | .254 | 54.94 |
| 133 | 9 | .5 | 2.0 | 78.13 | 4 | 254.9 | 205.5 | .243 | 41.83 |
| 133 | 9 | .5 | 2.0 | 78.13 | 4 | 243.6 | 205.5 | .264 | 53.76 |
| 133 | 9 | .5 | 2.0 | 78.13 | 4 | 247.1 | 205.5 | .244 | 52.82 |
| 133 | 9 | .5 | 2.0 | 78.13 | 4 | 226.5 | 205.5 | .265 | 103.83 |
| 133 | 9 | .5 | 2.0 | 78.13 | 4 | 243.0 | 205.5 | .254 | 54.76 |

| RUN | NO OF PEL | ETHYLENE CC/SC | HYDROGEN CC/SC | CONVERSION | THERMOCOUPLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 133 | 9 | 1.0 | 4.0 | 59.84 | 4 | 279.1 | 205.3 | .480 | 21.52 |
| 133 | 9 | 1.0 | 4.0 | 59.84 | 4 | 262.2 | 205.3 | .523 | 27.72 |
| 133 | 9 | 1.0 | 4.0 | 59.84 | 4 | 274.9 | 205.3 | .482 | 24.26 |
| 133 | 9 | 1.0 | 4.0 | 59.84 | 4 | 249.1 | 205.3 | .524 | 38.19 |
| 133 | 9 | 1.0 | 4.0 | 59.84 | 4 | 266.3 | 205.3 | .502 | 25.88 |
| 133 | 9 | 1.0 | 4.0 | 59.84 | 4 | 278.9 | 204.5 | .480 | 21.36 |
| 133 | 9 | 1.0 | 4.0 | 59.84 | 4 | 262.0 | 204.5 | .523 | 27.39 |
| 133 | 9 | 1.0 | 4.0 | 59.84 | 4 | 274.6 | 204.5 | .483 | 24.08 |
| 133 | 9 | 1.0 | 4.0 | 59.84 | 4 | 248.4 | 204.5 | .524 | 38.11 |
| 133 | 9 | 1.0 | 4.0 | 59.84 | 4 | 266.0 | 204.5 | .503 | 25.69 |
| 133 | 9 | 1.5 | 6.0 | 50.26 | 4 | 294.7 | 204.3 | .715 | 14.79 |
| 133 | 9 | 1.5 | 6.0 | 50.26 | 4 | 274.4 | 204.3 | .780 | 18.93 |
| 133 | 9 | 1.5 | 6.0 | 50.26 | 4 | 294.0 | 204.3 | .717 | 15.83 |
| 133 | 9 | 1.5 | 6.0 | 50.26 | 4 | 265.1 | 204.3 | .780 | 23.19 |
| 133 | 9 | 1.5 | 6.0 | 50.26 | 4 | 282.0 | 204.3 | .748 | 17.10 |
| 133 | 9 | 1.5 | 6.0 | 50.26 | 4 | 273.8 | 203.8 | .781 | 18.93 |
| 133 | 9 | 1.5 | 6.0 | 50.26 | 4 | 294.3 | 203.8 | .715 | 14.76 |
| 133 | 9 | 1.5 | 6.0 | 50.26 | 4 | 293.3 | 203.8 | .718 | 15.86 |
| 133 | 9 | 1.5 | 6.0 | 50.26 | 4 | 265.0 | 203.8 | .780 | 22.99 |
| 133 | 9 | 1.5 | 6.0 | 50.26 | 4 | 281.6 | 203.8 | .748 | 17.07 |
| 133 | 9 | 2.0 | 8.0 | 44.28 | 4 | 309.3 | 206.6 | .945 | 11.48 |
| 133 | 9 | 2.0 | 8.0 | 44.28 | 4 | 286.8 | 206.6 | 1.033 | 14.58 |
| 133 | 9 | 2.0 | 8.0 | 44.28 | 4 | 310.6 | 206.6 | .947 | 12.04 |
| 133 | 9 | 2.0 | 8.0 | 44.28 | 4 | 281.1 | 206.6 | 1.030 | 16.67 |
| 133 | 9 | 2.0 | 8.0 | 44.28 | 4 | 296.9 | 206.6 | .989 | 12.97 |
| 133 | 9 | 2.0 | 8.0 | 44.28 | 4 | 309.1 | 206.3 | .945 | 11.46 |
| 133 | 9 | 2.0 | 8.0 | 44.28 | 4 | 286.6 | 206.3 | 1.033 | 14.55 |
| 133 | 9 | 2.0 | 8.0 | 44.28 | 4 | 311.0 | 206.3 | .947 | 11.95 |
| 133 | 9 | 2.0 | 8.0 | 44.28 | 4 | 280.4 | 206.3 | 1.031 | 16.76 |
| 133 | 9 | 2.0 | 8.0 | 44.28 | 4 | 296.8 | 206.3 | .989 | 12.95 |
| 133 | 9 | 2.5 | 10.0 | 40.41 | 4 | 318.9 | 206.1 | 1.176 | 9.55 |
| 133 | 9 | 2.5 | 10.0 | 40.41 | 4 | 295.4 | 206.1 | 1.286 | 11.97 |
| 133 | 9 | 2.5 | 10.0 | 40.41 | 4 | 324.7 | 206.1 | 1.176 | 9.64 |
| 133 | 9 | 2.5 | 10.0 | 40.41 | 4 | 291.1 | 206.1 | 1.282 | 13.35 |
| 133 | 9 | 2.5 | 10.0 | 40.41 | 4 | 307.5 | 206.1 | 1.230 | 10.55 |
| 133 | 9 | 2.5 | 10.0 | 40.41 | 4 | 318.9 | 206.3 | 1.176 | 9.57 |
| 133 | 9 | 2.5 | 10.0 | 40.41 | 4 | 295.2 | 206.3 | 1.286 | 12.03 |
| 133 | 9 | 2.5 | 10.0 | 40.41 | 4 | 324.3 | 206.3 | 1.176 | 9.70 |
| 133 | 9 | 2.5 | 10.0 | 40.41 | 4 | 291.1 | 206.3 | 1.281 | 13.38 |
| 133 | 9 | 2.5 | 10.0 | 40.41 | 4 | 307.4 | 206.3 | 1.230 | 10.59 |
| 133 | 9 | 3.0 | 12.0 | 36.57 | 4 | 325.0 | 206.7 | 1.407 | 8.24 |
| 133 | 9 | 3.0 | 12.0 | 36.57 | 4 | 300.4 | 206.7 | 1.539 | 10.32 |
| 133 | 9 | 3.0 | 12.0 | 36.57 | 4 | 333.7 | 206.7 | 1.405 | 8.15 |
| 133 | 9 | 3.0 | 12.0 | 36.57 | 4 | 298.0 | 206.7 | 1.532 | 11.25 |
| 133 | 9 | 3.0 | 12.0 | 36.57 | 4 | 314.3 | 206.7 | 1.470 | 9.00 |
| 133 | 9 | 3.0 | 12.0 | 36.57 | 4 | 325.6 | 206.6 | 1.406 | 8.19 |
| 133 | 9 | 3.0 | 12.0 | 36.57 | 4 | 301.0 | 206.6 | 1.538 | 10.24 |
| 133 | 9 | 3.0 | 12.0 | 36.57 | 4 | 333.9 | 206.6 | 1.405 | 8.14 |
| 133 | 9 | 3.0 | 12.0 | 36.57 | 4 | 298.6 | 206.6 | 1.532 | 11.16 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 133 | 9 | 3.0 | 12.0 | 36.57 | 4 | 314.8 | 206.6 | 1.470 | 8.96 |
| 133 | 9 | 3.5 | 14.0 | 34.51 | 4 | 336.4 | 207.0 | 1.632 | 7.12 |
| 133 | 9 | 3.5 | 14.0 | 34.51 | 4 | 310.7 | 207.0 | 1.786 | 8.82 |
| 133 | 9 | 3.5 | 14.0 | 34.51 | 4 | 349.9 | 207.0 | 1.626 | 6.85 |
| 133 | 9 | 3.5 | 14.0 | 34.51 | 4 | 310.4 | 207.0 | 1.776 | 9.39 |
| 133 | 9 | 3.5 | 14.0 | 34.51 | 4 | 326.8 | 207.0 | 1.705 | 7.64 |
| 133 | 9 | 3.5 | 14.0 | 34.51 | 4 | 336.4 | 206.7 | 1.632 | 7.10 |
| 133 | 9 | 3.5 | 14.0 | 34.51 | 4 | 310.4 | 206.7 | 1.786 | 8.82 |
| 133 | 9 | 3.5 | 14.0 | 34.51 | 4 | 348.3 | 206.7 | 1.627 | 6.91 |
| 133 | 9 | 3.5 | 14.0 | 34.51 | 4 | 309.2 | 206.7 | 1.777 | 9.47 |
| 133 | 9 | 3.5 | 14.0 | 34.51 | 4 | 326.1 | 206.7 | 1.706 | 7.67 |
| 133 | 9 | 4.0 | 16.0 | 32.85 | 4 | 345.8 | 206.9 | 1.857 | 6.32 |
| 133 | 9 | 4.0 | 16.0 | 32.85 | 4 | 319.0 | 206.9 | 2.032 | 7.77 |
| 133 | 9 | 4.0 | 16.0 | 32.85 | 4 | 360.4 | 206.9 | 1.849 | 6.08 |
| 133 | 9 | 4.0 | 16.0 | 32.85 | 4 | 318.7 | 206.9 | 2.022 | 8.27 |
| 133 | 9 | 4.0 | 16.0 | 32.85 | 4 | 336.0 | 206.9 | 1.940 | 6.76 |
| 133 | 9 | 4.0 | 16.0 | 32.85 | 4 | 346.1 | 207.0 | 1.856 | 6.31 |
| 133 | 9 | 4.0 | 16.0 | 32.85 | 4 | 319.3 | 207.0 | 2.032 | 7.75 |
| 133 | 9 | 4.0 | 16.0 | 32.85 | 4 | 360.7 | 207.0 | 1.849 | 6.06 |
| 133 | 9 | 4.0 | 16.0 | 32.85 | 4 | 319.2 | 207.0 | 2.021 | 8.24 |
| 133 | 9 | 4.0 | 16.0 | 32.85 | 4 | 336.3 | 207.0 | 1.939 | 6.75 |
| 133 | 9 | 4.5 | 18.0 | 31.58 | 4 | 352.9 | 207.0 | 2.081 | 5.78 |
| 133 | 9 | 4.5 | 18.0 | 31.58 | 4 | 324.6 | 207.0 | 2.280 | 7.12 |
| 133 | 9 | 4.5 | 18.0 | 31.58 | 4 | 367.6 | 207.0 | 2.073 | 5.58 |
| 133 | 9 | 4.5 | 18.0 | 31.58 | 4 | 325.3 | 207.0 | 2.267 | 7.52 |
| 133 | 9 | 4.5 | 18.0 | 31.58 | 4 | 342.6 | 207.0 | 2.175 | 6.19 |
| 133 | 9 | 4.5 | 18.0 | 31.58 | 4 | 353.6 | 207.0 | 2.081 | 5.76 |
| 133 | 9 | 4.5 | 18.0 | 31.58 | 4 | 325.9 | 207.0 | 2.279 | 7.05 |
| 133 | 9 | 4.5 | 18.0 | 31.58 | 4 | 369.6 | 207.0 | 2.071 | 5.52 |
| 133 | 9 | 4.5 | 18.0 | 31.58 | 4 | 326.6 | 207.0 | 2.265 | 7.44 |
| 133 | 9 | 4.5 | 18.0 | 31.58 | 4 | 343.9 | 207.0 | 2.173 | 6.13 |
| 133 | 9 | 5.0 | 20.0 | 29.92 | 4 | 359.4 | 207.5 | 2.305 | 5.27 |
| 133 | 9 | 5.0 | 20.0 | 29.92 | 4 | 331.6 | 207.5 | 2.524 | 6.40 |
| 133 | 9 | 5.0 | 20.0 | 29.92 | 4 | 377.9 | 207.5 | 2.291 | 4.99 |
| 133 | 9 | 5.0 | 20.0 | 29.92 | 4 | 331.3 | 207.5 | 2.511 | 6.81 |
| 133 | 9 | 5.0 | 20.0 | 29.92 | 4 | 350.0 | 207.5 | 2.407 | 5.58 |
| 133 | 9 | 5.0 | 20.0 | 29.92 | 4 | 360.3 | 208.0 | 2.303 | 5.26 |
| 133 | 9 | 5.0 | 20.0 | 29.92 | 4 | 331.8 | 208.0 | 2.523 | 6.42 |
| 133 | 9 | 5.0 | 20.0 | 29.92 | 4 | 378.9 | 208.0 | 2.290 | 4.97 |
| 133 | 9 | 5.0 | 20.0 | 29.92 | 4 | 332.1 | 208.0 | 2.509 | 6.80 |
| 133 | 9 | 5.0 | 20.0 | 29.92 | 4 | 350.8 | 208.0 | 2.406 | 5.57 |
| 133 | 9 | 5.5 | 22.0 | 28.46 | 4 | 367.5 | 208.5 | 2.524 | 4.79 |
| 133 | 9 | 5.5 | 22.0 | 28.46 | 4 | 338.6 | 208.5 | 2.766 | 5.81 |
| 133 | 9 | 5.5 | 22.0 | 28.46 | 4 | 385.6 | 208.5 | 2.510 | 4.57 |
| 133 | 9 | 5.5 | 22.0 | 28.46 | 4 | 337.3 | 208.5 | 2.752 | 6.23 |
| 133 | 9 | 5.5 | 22.0 | 28.46 | 4 | 357.3 | 208.5 | 2.637 | 5.09 |
| 133 | 9 | 5.5 | 22.0 | 28.46 | 4 | 367.4 | 208.8 | 2.524 | 4.80 |
| 133 | 9 | 5.5 | 22.0 | 28.46 | 4 | 339.1 | 208.8 | 2.765 | 5.80 |
| 133 | 9 | 5.5 | 22.0 | 28.46 | 4 | 385.6 | 208.8 | 2.510 | 4.58 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 133 | 9 | 5.5 | 22.0 | 28.46 | 4 | 338.2 | 208.8 | 2.751 | 6.20 |
| 133 | 9 | 5.5 | 22.0 | 28.46 | 4 | 357.6 | 208.8 | 2.637 | 5.09 |
| 134 | 9 | .5 | 2.0 | 78.44 | 4 | 256.0 | 207.0 | .242 | 42.31 |
| 134 | 9 | .5 | 2.0 | 78.44 | 4 | 245.0 | 207.0 | .263 | 54.17 |
| 134 | 9 | .5 | 2.0 | 78.44 | 4 | 248.4 | 207.0 | .244 | 53.28 |
| 134 | 9 | .5 | 2.0 | 78.44 | 4 | 227.8 | 207.0 | .264 | 105.28 |
| 134 | 9 | .5 | 2.0 | 78.44 | 4 | 244.3 | 207.0 | .254 | 55.31 |
| 134 | 9 | .5 | 2.0 | 78.44 | 4 | 254.8 | 205.6 | .243 | 42.17 |
| 134 | 9 | .5 | 2.0 | 78.44 | 4 | 243.7 | 205.6 | .264 | 54.02 |
| 134 | 9 | .5 | 2.0 | 78.44 | 4 | 246.7 | 205.6 | .245 | 53.70 |
| 134 | 9 | .5 | 2.0 | 78.44 | 4 | 226.8 | 205.6 | .265 | 102.96 |
| 134 | 9 | .5 | 2.0 | 78.44 | 4 | 243.0 | 205.6 | .254 | 55.16 |
| 134 | 9 | .5 | 2.0 | 78.44 | 4 | 254.9 | 205.5 | .243 | 42.00 |
| 134 | 9 | .5 | 2.0 | 78.44 | 4 | 243.6 | 205.5 | .264 | 53.98 |
| 134 | 9 | .5 | 2.0 | 78.44 | 4 | 247.1 | 205.5 | .244 | 53.03 |
| 134 | 9 | .5 | 2.0 | 78.44 | 4 | 226.5 | 205.5 | .265 | 104.25 |
| 134 | 9 | .5 | 2.0 | 78.44 | 4 | 243.0 | 205.5 | .254 | 54.98 |
| 134 | 9 | 1.5 | 6.0 | 49.66 | 4 | 294.7 | 204.3 | .715 | 14.61 |
| 134 | 9 | 1.5 | 6.0 | 49.66 | 4 | 274.4 | 204.3 | .780 | 18.71 |
| 134 | 9 | 1.5 | 6.0 | 49.66 | 4 | 294.0 | 204.3 | .717 | 15.64 |
| 134 | 9 | 1.5 | 6.0 | 49.66 | 4 | 265.1 | 204.3 | .780 | 22.91 |
| 134 | 9 | 1.5 | 6.0 | 49.66 | 4 | 282.0 | 204.3 | .748 | 16.89 |
| 134 | 9 | 1.5 | 6.0 | 49.66 | 4 | 294.3 | 203.8 | .715 | 14.58 |
| 134 | 9 | 1.5 | 6.0 | 49.66 | 4 | 273.8 | 203.8 | .781 | 18.71 |
| 134 | 9 | 1.5 | 6.0 | 49.66 | 4 | 293.3 | 203.8 | .718 | 15.67 |
| 134 | 9 | 1.5 | 6.0 | 49.66 | 4 | 265.0 | 203.8 | .780 | 22.71 |
| 134 | 9 | 1.5 | 6.0 | 49.66 | 4 | 281.6 | 203.8 | .748 | 16.86 |
| 134 | 9 | 2.0 | 8.0 | 44.77 | 4 | 309.3 | 206.6 | .945 | 11.61 |
| 134 | 9 | 2.0 | 8.0 | 44.77 | 4 | 286.8 | 206.6 | 1.033 | 14.74 |
| 134 | 9 | 2.0 | 8.0 | 44.77 | 4 | 310.6 | 206.6 | .947 | 12.18 |
| 134 | 9 | 2.0 | 8.0 | 44.77 | 4 | 281.1 | 206.6 | 1.030 | 16.85 |
| 134 | 9 | 2.0 | 8.0 | 44.77 | 4 | 296.9 | 206.6 | .989 | 13.12 |
| 134 | 9 | 2.0 | 8.0 | 44.77 | 4 | 309.1 | 206.3 | .945 | 11.59 |
| 134 | 9 | 2.0 | 8.0 | 44.77 | 4 | 286.6 | 206.3 | 1.033 | 14.72 |
| 134 | 9 | 2.0 | 8.0 | 44.77 | 4 | 311.0 | 206.3 | .947 | 12.09 |
| 134 | 9 | 2.0 | 8.0 | 44.77 | 4 | 280.4 | 206.3 | 1.031 | 16.95 |
| 134 | 9 | 2.0 | 8.0 | 44.77 | 4 | 296.8 | 206.3 | .989 | 13.09 |
| 134 | 9 | 2.5 | 10.0 | 37.75 | 4 | 318.9 | 206.1 | 1.176 | 8.92 |
| 134 | 9 | 2.5 | 10.0 | 37.75 | 4 | 295.4 | 206.1 | 1.286 | 11.18 |
| 134 | 9 | 2.5 | 10.0 | 37.75 | 4 | 324.7 | 206.1 | 1.176 | 9.01 |
| 134 | 9 | 2.5 | 10.0 | 37.75 | 4 | 291.1 | 206.1 | 1.282 | 12.47 |
| 134 | 9 | 2.5 | 10.0 | 37.75 | 4 | 307.5 | 206.1 | 1.230 | 9.86 |
| 134 | 9 | 2.5 | 10.0 | 37.75 | 4 | 318.9 | 206.3 | 1.176 | 8.93 |
| 134 | 9 | 2.5 | 10.0 | 37.75 | 4 | 295.2 | 206.3 | 1.286 | 11.24 |
| 134 | 9 | 2.5 | 10.0 | 37.75 | 4 | 324.3 | 206.3 | 1.176 | 9.06 |
| 134 | 9 | 2.5 | 10.0 | 37.75 | 4 | 291.1 | 206.3 | 1.281 | 12.50 |
| 134 | 9 | 2.5 | 10.0 | 37.75 | 4 | 307.4 | 206.3 | 1.230 | 9.90 |
| 134 | 9 | 3.0 | 12.0 | 36.77 | 4 | 325.0 | 206.7 | 1.407 | 8.28 |
| 134 | 9 | 3.0 | 12.0 | 36.77 | 4 | 300.4 | 206.7 | 1.539 | 10.37 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 134 | 9 | 3.0 | 12.0 | 36.77 | 4 | 333.7 | 206.7 | 1.405 | 8.19 |
| 134 | 9 | 3.0 | 12.0 | 36.77 | 4 | 298.0 | 206.7 | 1.532 | 11.31 |
| 134 | 9 | 3.0 | 12.0 | 36.77 | 4 | 314.3 | 206.7 | 1.470 | 9.05 |
| 134 | 9 | 3.0 | 12.0 | 36.77 | 4 | 325.6 | 206.6 | 1.406 | 8.24 |
| 134 | 9 | 3.0 | 12.0 | 36.77 | 4 | 301.0 | 206.6 | 1.538 | 10.30 |
| 134 | 9 | 3.0 | 12.0 | 36.77 | 4 | 333.9 | 206.6 | 1.405 | 8.18 |
| 134 | 9 | 3.0 | 12.0 | 36.77 | 4 | 298.6 | 206.6 | 1.532 | 11.22 |
| 134 | 9 | 3.0 | 12.0 | 36.77 | 4 | 314.8 | 206.6 | 1.470 | 9.01 |
| 134 | 9 | 3.5 | 14.0 | 34.90 | 4 | 336.4 | 207.0 | 1.632 | 7.20 |
| 134 | 9 | 3.5 | 14.0 | 34.90 | 4 | 310.7 | 207.0 | 1.786 | 8.92 |
| 134 | 9 | 3.5 | 14.0 | 34.90 | 4 | 349.9 | 207.0 | 1.626 | 6.92 |
| 134 | 9 | 3.5 | 14.0 | 34.90 | 4 | 310.4 | 207.0 | 1.776 | 9.50 |
| 134 | 9 | 3.5 | 14.0 | 34.90 | 4 | 326.8 | 207.0 | 1.705 | 7.73 |
| 134 | 9 | 3.5 | 14.0 | 34.90 | 4 | 336.4 | 206.7 | 1.632 | 7.18 |
| 134 | 9 | 3.5 | 14.0 | 34.90 | 4 | 310.4 | 206.7 | 1.786 | 8.92 |
| 134 | 9 | 3.5 | 14.0 | 34.90 | 4 | 348.3 | 206.7 | 1.627 | 6.99 |
| 134 | 9 | 3.5 | 14.0 | 34.90 | 4 | 309.2 | 206.7 | 1.777 | 9.58 |
| 134 | 9 | 3.5 | 14.0 | 34.90 | 4 | 326.1 | 206.7 | 1.706 | 7.76 |
| 134 | 9 | 4.5 | 18.0 | 31.48 | 4 | 352.9 | 207.0 | 2.081 | 5.77 |
| 134 | 9 | 4.5 | 18.0 | 31.48 | 4 | 324.6 | 207.0 | 2.280 | 7.10 |
| 134 | 9 | 4.5 | 18.0 | 31.48 | 4 | 367.6 | 207.0 | 2.073 | 5.56 |
| 134 | 9 | 4.5 | 18.0 | 31.48 | 4 | 325.3 | 207.0 | 2.267 | 7.50 |
| 134 | 9 | 4.5 | 18.0 | 31.48 | 4 | 342.6 | 207.0 | 2.175 | 6.17 |
| 134 | 9 | 4.5 | 18.0 | 31.48 | 4 | 353.6 | 207.0 | 2.081 | 5.74 |
| 134 | 9 | 4.5 | 18.0 | 31.48 | 4 | 325.9 | 207.0 | 2.279 | 7.03 |
| 134 | 9 | 4.5 | 18.0 | 31.48 | 4 | 369.6 | 207.0 | 2.071 | 5.50 |
| 134 | 9 | 4.5 | 18.0 | 31.48 | 4 | 326.6 | 207.0 | 2.265 | 7.42 |
| 134 | 9 | 4.5 | 18.0 | 31.48 | 4 | 343.9 | 207.0 | 2.173 | 6.11 |
| 134 | 9 | 5.0 | 20.0 | 30.02 | 4 | 359.4 | 207.5 | 2.305 | 5.29 |
| 134 | 9 | 5.0 | 20.0 | 30.02 | 4 | 331.6 | 207.5 | 2.524 | 6.42 |
| 134 | 9 | 5.0 | 20.0 | 30.02 | 4 | 377.9 | 207.5 | 2.291 | 5.00 |
| 134 | 9 | 5.0 | 20.0 | 30.02 | 4 | 331.3 | 207.5 | 2.511 | 6.83 |
| 134 | 9 | 5.0 | 20.0 | 30.02 | 4 | 350.0 | 207.5 | 2.407 | 5.60 |
| 134 | 9 | 5.0 | 20.0 | 30.02 | 4 | 360.3 | 208.0 | 2.303 | 5.27 |
| 134 | 9 | 5.0 | 20.0 | 30.02 | 4 | 331.8 | 208.0 | 2.523 | 6.44 |
| 134 | 9 | 5.0 | 20.0 | 30.02 | 4 | 378.9 | 208.0 | 2.290 | 4.99 |
| 134 | 9 | 5.0 | 20.0 | 30.02 | 4 | 332.1 | 208.0 | 2.509 | 6.82 |
| 134 | 9 | 5.0 | 20.0 | 30.02 | 4 | 350.8 | 208.0 | 2.406 | 5.59 |
| 135 | 9 | .5 | 2.0 | 78.21 | 4 | 256.0 | 207.0 | .242 | 42.18 |
| 135 | 9 | .5 | 2.0 | 78.21 | 4 | 245.0 | 207.0 | .263 | 54.01 |
| 135 | 9 | .5 | 2.0 | 78.21 | 4 | 248.4 | 207.0 | .244 | 53.13 |
| 135 | 9 | .5 | 2.0 | 78.21 | 4 | 227.8 | 207.0 | .264 | 104.96 |
| 135 | 9 | .5 | 2.0 | 78.21 | 4 | 244.3 | 207.0 | .254 | 55.14 |
| 135 | 9 | .5 | 2.0 | 78.21 | 4 | 254.8 | 205.6 | .243 | 42.04 |
| 135 | 9 | .5 | 2.0 | 78.21 | 4 | 243.7 | 205.6 | .264 | 53.86 |
| 135 | 9 | .5 | 2.0 | 78.21 | 4 | 246.7 | 205.6 | .245 | 53.54 |
| 135 | 9 | .5 | 2.0 | 78.21 | 4 | 226.8 | 205.6 | .265 | 102.66 |
| 135 | 9 | .5 | 2.0 | 78.21 | 4 | 243.0 | 205.6 | .254 | 54.99 |
| 135 | 9 | .5 | 2.0 | 78.21 | 4 | 254.9 | 205.5 | .243 | 41.87 |

| RUN | NO OF PEL | ETHYLENE CC/SC | HYDROGEN CC/SC | CONVERSION | THERMOCOUPLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 135 | 9 | .5 | 2.0 | 78.21 | 4 | 243.6 | 205.5 | .264 | 53.82 |
| 135 | 9 | .5 | 2.0 | 78.21 | 4 | 247.1 | 205.5 | .244 | 52.87 |
| 135 | 9 | .5 | 2.0 | 78.21 | 4 | 226.5 | 205.5 | .265 | 103.94 |
| 135 | 9 | .5 | 2.0 | 78.21 | 4 | 243.0 | 205.5 | .254 | 54.81 |
| 135 | 9 | 1.0 | 4.0 | 59.50 | 4 | 279.1 | 205.3 | .480 | 21.40 |
| 135 | 9 | 1.0 | 4.0 | 59.50 | 4 | 262.2 | 205.3 | .523 | 27.56 |
| 135 | 9 | 1.0 | 4.0 | 59.50 | 4 | 274.9 | 205.3 | .482 | 24.12 |
| 135 | 9 | 1.0 | 4.0 | 59.50 | 4 | 249.1 | 205.3 | .524 | 37.97 |
| 135 | 9 | 1.0 | 4.0 | 59.50 | 4 | 266.3 | 205.3 | .502 | 25.73 |
| 135 | 9 | 1.0 | 4.0 | 59.50 | 4 | 278.9 | 204.5 | .480 | 21.24 |
| 135 | 9 | 1.0 | 4.0 | 59.50 | 4 | 262.0 | 204.5 | .523 | 27.24 |
| 135 | 9 | 1.0 | 4.0 | 59.50 | 4 | 274.6 | 204.5 | .483 | 23.94 |
| 135 | 9 | 1.0 | 4.0 | 59.50 | 4 | 248.4 | 204.5 | .524 | 37.90 |
| 135 | 9 | 1.0 | 4.0 | 59.50 | 4 | 266.0 | 204.5 | .503 | 25.54 |
| 135 | 9 | 1.5 | 6.0 | 50.69 | 4 | 294.7 | 204.3 | .715 | 14.92 |
| 135 | 9 | 1.5 | 6.0 | 50.69 | 4 | 274.4 | 204.3 | .780 | 19.09 |
| 135 | 9 | 1.5 | 6.0 | 50.69 | 4 | 294.0 | 204.3 | .717 | 15.96 |
| 135 | 9 | 1.5 | 6.0 | 50.69 | 4 | 265.1 | 204.3 | .780 | 23.38 |
| 135 | 9 | 1.5 | 6.0 | 50.69 | 4 | 282.0 | 204.3 | .748 | 17.24 |
| 135 | 9 | 1.5 | 6.0 | 50.69 | 4 | 294.3 | 203.8 | .715 | 14.88 |
| 135 | 9 | 1.5 | 6.0 | 50.69 | 4 | 273.8 | 203.8 | .781 | 19.09 |
| 135 | 9 | 1.5 | 6.0 | 50.69 | 4 | 293.3 | 203.8 | .718 | 15.99 |
| 135 | 9 | 1.5 | 6.0 | 50.69 | 4 | 265.0 | 203.8 | .780 | 23.18 |
| 135 | 9 | 1.5 | 6.0 | 50.69 | 4 | 281.6 | 203.8 | .748 | 17.21 |
| 135 | 9 | 2.0 | 8.0 | 44.55 | 4 | 309.3 | 206.6 | .945 | 11.55 |
| 135 | 9 | 2.0 | 8.0 | 44.55 | 4 | 286.8 | 206.6 | 1.033 | 14.67 |
| 135 | 9 | 2.0 | 8.0 | 44.55 | 4 | 310.6 | 206.6 | .947 | 12.12 |
| 135 | 9 | 2.0 | 8.0 | 44.55 | 4 | 281.1 | 206.6 | 1.030 | 16.77 |
| 135 | 9 | 2.0 | 8.0 | 44.55 | 4 | 296.9 | 206.6 | .989 | 13.05 |
| 135 | 9 | 2.0 | 8.0 | 44.55 | 4 | 309.1 | 206.3 | .945 | 11.53 |
| 135 | 9 | 2.0 | 8.0 | 44.55 | 4 | 286.6 | 206.3 | 1.033 | 14.64 |
| 135 | 9 | 2.0 | 8.0 | 44.55 | 4 | 311.0 | 206.3 | .947 | 12.03 |
| 135 | 9 | 2.0 | 8.0 | 44.55 | 4 | 280.4 | 206.3 | 1.031 | 16.86 |
| 135 | 9 | 2.0 | 8.0 | 44.55 | 4 | 296.8 | 206.3 | .989 | 13.03 |
| 135 | 9 | 2.5 | 10.0 | 40.02 | 4 | 318.9 | 206.1 | 1.176 | 9.45 |
| 135 | 9 | 2.5 | 10.0 | 40.02 | 4 | 295.4 | 206.1 | 1.286 | 11.85 |
| 135 | 9 | 2.5 | 10.0 | 40.02 | 4 | 324.7 | 206.1 | 1.176 | 9.55 |
| 135 | 9 | 2.5 | 10.0 | 40.02 | 4 | 291.1 | 206.1 | 1.282 | 13.22 |
| 135 | 9 | 2.5 | 10.0 | 40.02 | 4 | 307.5 | 206.1 | 1.230 | 10.45 |
| 135 | 9 | 2.5 | 10.0 | 40.02 | 4 | 318.9 | 206.3 | 1.176 | 9.47 |
| 135 | 9 | 2.5 | 10.0 | 40.02 | 4 | 295.2 | 206.3 | 1.286 | 11.91 |
| 135 | 9 | 2.5 | 10.0 | 40.02 | 4 | 324.3 | 206.3 | 1.176 | 9.60 |
| 135 | 9 | 2.5 | 10.0 | 40.02 | 4 | 291.1 | 206.3 | 1.281 | 13.25 |
| 135 | 9 | 2.5 | 10.0 | 40.02 | 4 | 307.4 | 206.3 | 1.230 | 10.49 |
| 135 | 9 | 3.0 | 12.0 | 36.79 | 4 | 325.0 | 206.7 | 1.407 | 8.29 |
| 135 | 9 | 3.0 | 12.0 | 36.79 | 4 | 300.4 | 206.7 | 1.539 | 10.38 |
| 135 | 9 | 3.0 | 12.0 | 36.79 | 4 | 333.7 | 206.7 | 1.405 | 8.20 |
| 135 | 9 | 3.0 | 12.0 | 36.79 | 4 | 298.0 | 206.7 | 1.532 | 11.32 |
| 135 | 9 | 3.0 | 12.0 | 36.79 | 4 | 314.3 | 206.7 | 1.470 | 9.06 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 135 | 9 | 3.0 | 12.0 | 36.79 | 4 | 325.6 | 206.6 | 1.406 | 8.24 |
| 135 | 9 | 3.0 | 12.0 | 36.79 | 4 | 301.0 | 206.6 | 1.538 | 10.31 |
| 135 | 9 | 3.0 | 12.0 | 36.79 | 4 | 333.9 | 206.6 | 1.405 | 8.19 |
| 135 | 9 | 3.0 | 12.0 | 36.79 | 4 | 298.6 | 206.6 | 1.532 | 11.23 |
| 135 | 9 | 3.0 | 12.0 | 36.79 | 4 | 314.8 | 206.6 | 1.470 | 9.01 |
| 135 | 9 | 3.5 | 14.0 | 34.78 | 4 | 336.4 | 207.0 | 1.632 | 7.17 |
| 135 | 9 | 3.5 | 14.0 | 34.78 | 4 | 310.7 | 207.0 | 1.786 | 8.89 |
| 135 | 9 | 3.5 | 14.0 | 34.78 | 4 | 349.9 | 207.0 | 1.626 | 6.90 |
| 135 | 9 | 3.5 | 14.0 | 34.78 | 4 | 310.4 | 207.0 | 1.776 | 9.46 |
| 135 | 9 | 3.5 | 14.0 | 34.78 | 4 | 326.8 | 207.0 | 1.705 | 7.70 |
| 135 | 9 | 3.5 | 14.0 | 34.78 | 4 | 336.4 | 206.7 | 1.632 | 7.16 |
| 135 | 9 | 3.5 | 14.0 | 34.78 | 4 | 310.4 | 206.7 | 1.786 | 8.88 |
| 135 | 9 | 3.5 | 14.0 | 34.78 | 4 | 348.3 | 206.7 | 1.627 | 6.96 |
| 135 | 9 | 3.5 | 14.0 | 34.78 | 4 | 309.2 | 206.7 | 1.777 | 9.54 |
| 135 | 9 | 3.5 | 14.0 | 34.78 | 4 | 326.1 | 206.7 | 1.706 | 7.73 |
| 135 | 9 | 4.0 | 16.0 | 32.98 | 4 | 345.8 | 206.9 | 1.857 | 6.34 |
| 135 | 9 | 4.0 | 16.0 | 32.98 | 4 | 319.0 | 206.9 | 2.032 | 7.80 |
| 135 | 9 | 4.0 | 16.0 | 32.98 | 4 | 360.4 | 206.9 | 1.849 | 6.10 |
| 135 | 9 | 4.0 | 16.0 | 32.98 | 4 | 318.7 | 206.9 | 2.022 | 8.31 |
| 135 | 9 | 4.0 | 16.0 | 32.98 | 4 | 336.0 | 206.9 | 1.940 | 6.79 |
| 135 | 9 | 4.0 | 16.0 | 32.98 | 4 | 346.1 | 207.0 | 1.856 | 6.33 |
| 135 | 9 | 4.0 | 16.0 | 32.98 | 4 | 319.3 | 207.0 | 2.032 | 7.78 |
| 135 | 9 | 4.0 | 16.0 | 32.98 | 4 | 360.7 | 207.0 | 1.849 | 6.09 |
| 135 | 9 | 4.0 | 16.0 | 32.98 | 4 | 319.2 | 207.0 | 2.021 | 8.27 |
| 135 | 9 | 4.0 | 16.0 | 32.98 | 4 | 336.3 | 207.0 | 1.939 | 6.77 |
| 135 | 9 | 4.5 | 18.0 | 32.87 | 4 | 352.9 | 207.0 | 2.081 | 6.02 |
| 135 | 9 | 4.5 | 18.0 | 32.87 | 4 | 324.6 | 207.0 | 2.280 | 7.41 |
| 135 | 9 | 4.5 | 18.0 | 32.87 | 4 | 367.6 | 207.0 | 2.073 | 5.81 |
| 135 | 9 | 4.5 | 18.0 | 32.87 | 4 | 325.3 | 207.0 | 2.267 | 7.83 |
| 135 | 9 | 4.5 | 18.0 | 32.87 | 4 | 342.6 | 207.0 | 2.175 | 6.44 |
| 135 | 9 | 4.5 | 18.0 | 32.87 | 4 | 353.6 | 207.0 | 2.081 | 6.00 |
| 135 | 9 | 4.5 | 18.0 | 32.87 | 4 | 325.9 | 207.0 | 2.279 | 7.34 |
| 135 | 9 | 4.5 | 18.0 | 32.87 | 4 | 369.6 | 207.0 | 2.071 | 5.74 |
| 135 | 9 | 4.5 | 18.0 | 32.87 | 4 | 326.6 | 207.0 | 2.265 | 7.75 |
| 135 | 9 | 4.5 | 18.0 | 32.87 | 4 | 343.9 | 207.0 | 2.173 | 6.38 |
| 135 | 9 | 5.0 | 20.0 | 30.19 | 4 | 359.4 | 207.5 | 2.305 | 5.32 |
| 135 | 9 | 5.0 | 20.0 | 30.19 | 4 | 331.6 | 207.5 | 2.524 | 6.46 |
| 135 | 9 | 5.0 | 20.0 | 30.19 | 4 | 377.9 | 207.5 | 2.291 | 5.03 |
| 135 | 9 | 5.0 | 20.0 | 30.19 | 4 | 331.3 | 207.5 | 2.511 | 6.87 |
| 135 | 9 | 5.0 | 20.0 | 30.19 | 4 | 350.0 | 207.5 | 2.407 | 5.63 |
| 135 | 9 | 5.0 | 20.0 | 30.19 | 4 | 360.3 | 208.0 | 2.303 | 5.30 |
| 135 | 9 | 5.0 | 20.0 | 30.19 | 4 | 331.8 | 208.0 | 2.523 | 6.47 |
| 135 | 9 | 5.0 | 20.0 | 30.19 | 4 | 378.9 | 208.0 | 2.290 | 5.02 |
| 135 | 9 | 5.0 | 20.0 | 30.19 | 4 | 332.1 | 208.0 | 2.509 | 6.86 |
| 135 | 9 | 5.0 | 20.0 | 30.19 | 4 | 350.8 | 208.0 | 2.406 | 5.62 |
| 135 | 9 | 5.5 | 22.0 | 28.82 | 4 | 367.5 | 208.5 | 2.524 | 4.85 |
| 135 | 9 | 5.5 | 22.0 | 28.82 | 4 | 338.6 | 208.5 | 2.766 | 5.89 |
| 135 | 9 | 5.5 | 22.0 | 28.82 | 4 | 385.6 | 208.5 | 2.510 | 4.63 |
| 135 | 9 | 5.5 | 22.0 | 28.82 | 4 | 337.3 | 208.5 | 2.752 | 6.31 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 135 | 9 | 5.5 | 22.0 | 28.82 | 4 | 357.3 | 208.5 | 2.637 | 5.16 |
| 135 | 9 | 5.5 | 22.0 | 28.82 | 4 | 367.4 | 208.8 | 2.524 | 4.86 |
| 135 | 9 | 5.5 | 22.0 | 28.82 | 4 | 339.1 | 208.8 | 2.765 | 5.87 |
| 135 | 9 | 5.5 | 22.0 | 28.82 | 4 | 385.6 | 208.8 | 2.510 | 4.63 |
| 135 | 9 | 5.5 | 22.0 | 28.82 | 4 | 338.2 | 208.8 | 2.751 | 6.28 |
| 135 | 9 | 5.5 | 22.0 | 28.82 | 4 | 357.6 | 208.8 | 2.637 | 5.15 |
| 141 | 9 | .5 | 2.0 | 72.33 | 4 | 200.6 | 154.1 | .257 | 41.59 |
| 141 | 9 | .5 | 2.0 | 72.33 | 4 | 190.6 | 154.1 | .280 | 52.47 |
| 141 | 9 | .5 | 2.0 | 72.33 | 4 | 195.1 | 154.1 | .259 | 50.09 |
| 141 | 9 | .5 | 2.0 | 72.33 | 4 | 171.1 | 154.1 | .281 | 119.54 |
| 141 | 9 | .5 | 2.0 | 72.33 | 4 | 189.3 | 154.1 | .269 | 54.49 |
| 141 | 9 | .5 | 2.0 | 72.33 | 4 | 199.8 | 152.9 | .258 | 41.24 |
| 141 | 9 | .5 | 2.0 | 72.33 | 4 | 189.8 | 152.9 | .280 | 52.04 |
| 141 | 9 | .5 | 2.0 | 72.33 | 4 | 194.1 | 152.9 | .259 | 49.85 |
| 141 | 9 | .5 | 2.0 | 72.33 | 4 | 170.6 | 152.9 | .282 | 115.06 |
| 141 | 9 | .5 | 2.0 | 72.33 | 4 | 188.6 | 152.9 | .270 | 53.89 |
| 141 | 9 | 1.5 | 6.0 | 44.38 | 4 | 242.0 | 154.2 | .755 | 13.57 |
| 141 | 9 | 1.5 | 6.0 | 44.38 | 4 | 221.2 | 154.2 | .825 | 17.65 |
| 141 | 9 | 1.5 | 6.0 | 44.38 | 4 | 240.6 | 154.2 | .758 | 14.65 |
| 141 | 9 | 1.5 | 6.0 | 44.38 | 4 | 203.2 | 154.2 | .829 | 25.62 |
| 141 | 9 | 1.5 | 6.0 | 44.38 | 4 | 226.8 | 154.2 | .792 | 16.33 |
| 141 | 9 | 1.5 | 6.0 | 44.38 | 4 | 241.9 | 154.5 | .755 | 13.62 |
| 141 | 9 | 1.5 | 6.0 | 44.38 | 4 | 221.4 | 154.5 | .825 | 17.67 |
| 141 | 9 | 1.5 | 6.0 | 44.38 | 4 | 241.2 | 154.5 | .757 | 14.59 |
| 141 | 9 | 1.5 | 6.0 | 44.38 | 4 | 203.9 | 154.5 | .829 | 25.37 |
| 141 | 9 | 1.5 | 6.0 | 44.38 | 4 | 227.1 | 154.5 | .791 | 16.30 |
| 141 | 9 | 2.5 | 10.0 | 37.85 | 4 | 266.3 | 154.0 | 1.242 | 9.07 |
| 141 | 9 | 2.5 | 10.0 | 37.85 | 4 | 241.6 | 154.0 | 1.360 | 11.55 |
| 141 | 9 | 2.5 | 10.0 | 37.85 | 4 | 272.7 | 154.0 | 1.241 | 9.13 |
| 141 | 9 | 2.5 | 10.0 | 37.85 | 4 | 230.4 | 154.0 | 1.361 | 14.06 |
| 141 | 9 | 2.5 | 10.0 | 37.85 | 4 | 252.7 | 154.0 | 1.301 | 10.26 |
| 141 | 9 | 2.5 | 10.0 | 37.85 | 4 | 266.2 | 154.1 | 1.242 | 9.09 |
| 141 | 9 | 2.5 | 10.0 | 37.85 | 4 | 241.3 | 154.1 | 1.360 | 11.59 |
| 141 | 9 | 2.5 | 10.0 | 37.85 | 4 | 272.5 | 154.1 | 1.242 | 9.14 |
| 141 | 9 | 2.5 | 10.0 | 37.85 | 4 | 230.7 | 154.1 | 1.361 | 14.01 |
| 141 | 9 | 2.5 | 10.0 | 37.85 | 4 | 252.7 | 154.1 | 1.301 | 10.27 |
| 141 | 9 | 3.5 | 14.0 | 36.18 | 4 | 285.7 | 154.3 | 1.721 | 7.43 |
| 141 | 9 | 3.5 | 14.0 | 36.18 | 4 | 258.5 | 154.3 | 1.887 | 9.30 |
| 141 | 9 | 3.5 | 14.0 | 36.18 | 4 | 299.5 | 154.3 | 1.713 | 7.14 |
| 141 | 9 | 3.5 | 14.0 | 36.18 | 4 | 251.5 | 154.3 | 1.883 | 10.58 |
| 141 | 9 | 3.5 | 14.0 | 36.18 | 4 | 273.8 | 154.3 | 1.801 | 8.12 |
| 141 | 9 | 3.5 | 14.0 | 36.18 | 4 | 285.6 | 154.3 | 1.721 | 7.44 |
| 141 | 9 | 3.5 | 14.0 | 36.18 | 4 | 258.1 | 154.3 | 1.887 | 9.33 |
| 141 | 9 | 3.5 | 14.0 | 36.18 | 4 | 298.3 | 154.3 | 1.714 | 7.20 |
| 141 | 9 | 3.5 | 14.0 | 36.18 | 4 | 250.9 | 154.3 | 1.884 | 10.65 |
| 141 | 9 | 3.5 | 14.0 | 36.18 | 4 | 273.2 | 154.3 | 1.801 | 8.16 |
| 141 | 9 | 4.5 | 18.0 | 30.80 | 4 | 301.8 | 154.2 | 2.194 | 5.64 |
| 141 | 9 | 4.5 | 18.0 | 30.80 | 4 | 272.5 | 154.2 | 2.408 | 6.99 |
| 141 | 9 | 4.5 | 18.0 | 30.80 | 4 | 319.6 | 154.2 | 2.180 | 5.35 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 141 | 9 | 4.5 | 18.0 | 30.80 | 4 | 265.9 | 154.2 | 2.403 | 7.86 |
| 141 | 9 | 4.5 | 18.0 | 30.80 | 4 | 290.0 | 154.2 | 2.295 | 6.10 |
| 141 | 9 | 4.5 | 18.0 | 30.80 | 4 | 301.9 | 154.2 | 2.194 | 5.64 |
| 141 | 9 | 4.5 | 18.0 | 30.80 | 4 | 272.9 | 154.2 | 2.407 | 6.96 |
| 141 | 9 | 4.5 | 18.0 | 30.80 | 4 | 319.5 | 154.2 | 2.180 | 5.35 |
| 141 | 9 | 4.5 | 18.0 | 30.80 | 4 | 266.6 | 154.2 | 2.402 | 7.81 |
| 141 | 9 | 4.5 | 18.0 | 30.80 | 4 | 290.2 | 154.2 | 2.295 | 6.09 |
| 141 | 9 | 5.5 | 22.0 | 29.24 | 4 | 313.9 | 154.1 | 2.665 | 4.95 |
| 141 | 9 | 5.5 | 22.0 | 29.24 | 4 | 283.7 | 154.1 | 2.925 | 6.06 |
| 141 | 9 | 5.5 | 22.0 | 29.24 | 4 | 333.4 | 154.1 | 2.646 | 4.69 |
| 141 | 9 | 5.5 | 22.0 | 29.24 | 4 | 276.3 | 154.1 | 2.921 | 6.83 |
| 141 | 9 | 5.5 | 22.0 | 29.24 | 4 | 301.8 | 154.1 | 2.788 | 5.33 |
| 141 | 9 | 5.5 | 22.0 | 29.24 | 4 | 312.3 | 154.0 | 2.667 | 5.00 |
| 141 | 9 | 5.5 | 22.0 | 29.24 | 4 | 281.8 | 154.0 | 2.928 | 6.14 |
| 141 | 9 | 5.5 | 22.0 | 29.24 | 4 | 332.2 | 154.0 | 2.647 | 4.72 |
| 141 | 9 | 5.5 | 22.0 | 29.24 | 4 | 275.6 | 154.0 | 2.922 | 6.86 |
| 141 | 9 | 5.5 | 22.0 | 29.24 | 4 | 300.5 | 154.0 | 2.790 | 5.37 |
| 142 | 9 | .5 | 2.0 | 72.64 | 4 | 200.6 | 154.1 | .257 | 41.77 |
| 142 | 9 | .5 | 2.0 | 72.64 | 4 | 190.6 | 154.1 | .280 | 52.69 |
| 142 | 9 | .5 | 2.0 | 72.64 | 4 | 195.1 | 154.1 | .259 | 50.31 |
| 142 | 9 | .5 | 2.0 | 72.64 | 4 | 171.1 | 154.1 | .281 | 120.05 |
| 142 | 9 | .5 | 2.0 | 72.64 | 4 | 189.3 | 154.1 | .269 | 54.72 |
| 142 | 9 | .5 | 2.0 | 72.64 | 4 | 199.8 | 152.9 | .258 | 41.41 |
| 142 | 9 | .5 | 2.0 | 72.64 | 4 | 189.8 | 152.9 | .280 | 52.26 |
| 142 | 9 | .5 | 2.0 | 72.64 | 4 | 194.1 | 152.9 | .259 | 50.06 |
| 142 | 9 | .5 | 2.0 | 72.64 | 4 | 170.6 | 152.9 | .282 | 115.55 |
| 142 | 9 | .5 | 2.0 | 72.64 | 4 | 188.6 | 152.9 | .270 | 54.13 |
| 142 | 9 | 1.5 | 6.0 | 47.46 | 4 | 242.0 | 154.2 | .755 | 14.52 |
| 142 | 9 | 1.5 | 6.0 | 47.46 | 4 | 221.2 | 154.2 | .825 | 18.88 |
| 142 | 9 | 1.5 | 6.0 | 47.46 | 4 | 240.6 | 154.2 | .758 | 15.67 |
| 142 | 9 | 1.5 | 6.0 | 47.46 | 4 | 203.2 | 154.2 | .829 | 27.40 |
| 142 | 9 | 1.5 | 6.0 | 47.46 | 4 | 226.8 | 154.2 | .792 | 17.47 |
| 142 | 9 | 1.5 | 6.0 | 47.46 | 4 | 241.9 | 154.5 | .755 | 14.57 |
| 142 | 9 | 1.5 | 6.0 | 47.46 | 4 | 221.4 | 154.5 | .825 | 18.90 |
| 142 | 9 | 1.5 | 6.0 | 47.46 | 4 | 241.2 | 154.5 | .757 | 15.61 |
| 142 | 9 | 1.5 | 6.0 | 47.46 | 4 | 203.9 | 154.5 | .829 | 27.14 |
| 142 | 9 | 1.5 | 6.0 | 47.46 | 4 | 227.1 | 154.5 | .791 | 17.44 |
| 142 | 9 | 2.5 | 10.0 | 38.74 | 4 | 266.3 | 154.0 | 1.242 | 9.29 |
| 142 | 9 | 2.5 | 10.0 | 38.74 | 4 | 241.6 | 154.0 | 1.360 | 11.82 |
| 142 | 9 | 2.5 | 10.0 | 38.74 | 4 | 272.7 | 154.0 | 1.241 | 9.34 |
| 142 | 9 | 2.5 | 10.0 | 38.74 | 4 | 230.4 | 154.0 | 1.361 | 14.39 |
| 142 | 9 | 2.5 | 10.0 | 38.74 | 4 | 252.7 | 154.0 | 1.301 | 10.50 |
| 142 | 9 | 2.5 | 10.0 | 38.74 | 4 | 266.2 | 154.1 | 1.242 | 9.30 |
| 142 | 9 | 2.5 | 10.0 | 38.74 | 4 | 241.3 | 154.1 | 1.360 | 11.86 |
| 142 | 9 | 2.5 | 10.0 | 38.74 | 4 | 272.5 | 154.1 | 1.242 | 9.35 |
| 142 | 9 | 2.5 | 10.0 | 38.74 | 4 | 230.7 | 154.1 | 1.361 | 14.34 |
| 142 | 9 | 2.5 | 10.0 | 38.74 | 4 | 252.7 | 154.1 | 1.301 | 10.51 |
| 142 | 9 | 3.5 | 14.0 | 33.63 | 4 | 285.7 | 154.3 | 1.721 | 6.91 |
| 142 | 9 | 3.5 | 14.0 | 33.63 | 4 | 258.5 | 154.3 | 1.887 | 8.64 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 142 | 9 | 3.5 | 14.0 | 33.63 | 4 | 299.5 | 154.3 | 1.713 | 6.64 |
| 142 | 9 | 3.5 | 14.0 | 33.63 | 4 | 251.5 | 154.3 | 1.883 | 9.84 |
| 142 | 9 | 3.5 | 14.0 | 33.63 | 4 | 273.8 | 154.3 | 1.801 | 7.55 |
| 142 | 9 | 3.5 | 14.0 | 33.63 | 4 | 285.6 | 154.3 | 1.721 | 6.91 |
| 142 | 9 | 3.5 | 14.0 | 33.63 | 4 | 258.1 | 154.3 | 1.887 | 8.67 |
| 142 | 9 | 3.5 | 14.0 | 33.63 | 4 | 298.3 | 154.3 | 1.714 | 6.70 |
| 142 | 9 | 3.5 | 14.0 | 33.63 | 4 | 250.9 | 154.3 | 1.884 | 9.90 |
| 142 | 9 | 3.5 | 14.0 | 33.63 | 4 | 273.2 | 154.3 | 1.801 | 7.59 |
| 142 | 9 | 4.5 | 18.0 | 30.70 | 4 | 301.8 | 154.2 | 2.194 | 5.62 |
| 142 | 9 | 4.5 | 18.0 | 30.70 | 4 | 272.5 | 154.2 | 2.408 | 6.96 |
| 142 | 9 | 4.5 | 18.0 | 30.70 | 4 | 319.6 | 154.2 | 2.180 | 5.33 |
| 142 | 9 | 4.5 | 18.0 | 30.70 | 4 | 265.9 | 154.2 | 2.403 | 7.83 |
| 142 | 9 | 4.5 | 18.0 | 30.70 | 4 | 290.0 | 154.2 | 2.295 | 6.08 |
| 142 | 9 | 4.5 | 18.0 | 30.70 | 4 | 301.9 | 154.2 | 2.194 | 5.62 |
| 142 | 9 | 4.5 | 18.0 | 30.70 | 4 | 272.9 | 154.2 | 2.407 | 6.94 |
| 142 | 9 | 4.5 | 18.0 | 30.70 | 4 | 319.5 | 154.2 | 2.180 | 5.33 |
| 142 | 9 | 4.5 | 18.0 | 30.70 | 4 | 266.6 | 154.2 | 2.402 | 7.78 |
| 142 | 9 | 4.5 | 18.0 | 30.70 | 4 | 290.2 | 154.2 | 2.295 | 6.07 |
| 142 | 9 | 5.5 | 22.0 | 28.95 | 4 | 313.9 | 154.1 | 2.665 | 4.90 |
| 142 | 9 | 5.5 | 22.0 | 28.95 | 4 | 283.7 | 154.1 | 2.925 | 6.00 |
| 142 | 9 | 5.5 | 22.0 | 28.95 | 4 | 333.4 | 154.1 | 2.646 | 4.64 |
| 142 | 9 | 5.5 | 22.0 | 28.95 | 4 | 276.3 | 154.1 | 2.921 | 6.76 |
| 142 | 9 | 5.5 | 22.0 | 28.95 | 4 | 301.8 | 154.1 | 2.788 | 5.27 |
| 142 | 9 | 5.5 | 22.0 | 28.95 | 4 | 312.3 | 154.0 | 2.667 | 4.95 |
| 142 | 9 | 5.5 | 22.0 | 28.95 | 4 | 281.8 | 154.0 | 2.928 | 6.08 |
| 142 | 9 | 5.5 | 22.0 | 28.95 | 4 | 332.2 | 154.0 | 2.647 | 4.67 |
| 142 | 9 | 5.5 | 22.0 | 28.95 | 4 | 275.6 | 154.0 | 2.922 | 6.79 |
| 142 | 9 | 5.5 | 22.0 | 28.95 | 4 | 300.5 | 154.0 | 2.790 | 5.32 |
| 143 | 9 | .5 | 2.0 | 72.33 | 4 | 200.6 | 154.1 | .257 | 41.59 |
| 143 | 9 | .5 | 2.0 | 72.33 | 4 | 190.6 | 154.1 | .280 | 52.47 |
| 143 | 9 | .5 | 2.0 | 72.33 | 4 | 195.1 | 154.1 | .259 | 50.09 |
| 143 | 9 | .5 | 2.0 | 72.33 | 4 | 171.1 | 154.1 | .281 | 119.54 |
| 143 | 9 | .5 | 2.0 | 72.33 | 4 | 189.3 | 154.1 | .269 | 54.49 |
| 143 | 9 | .5 | 2.0 | 72.33 | 4 | 199.8 | 152.9 | .258 | 41.24 |
| 143 | 9 | .5 | 2.0 | 72.33 | 4 | 189.8 | 152.9 | .280 | 52.04 |
| 143 | 9 | .5 | 2.0 | 72.33 | 4 | 194.1 | 152.9 | .259 | 49.85 |
| 143 | 9 | .5 | 2.0 | 72.33 | 4 | 170.6 | 152.9 | .282 | 115.06 |
| 143 | 9 | .5 | 2.0 | 72.33 | 4 | 188.6 | 152.9 | .270 | 53.89 |
| 143 | 9 | 1.5 | 6.0 | 47.06 | 4 | 242.0 | 154.2 | .755 | 14.40 |
| 143 | 9 | 1.5 | 6.0 | 47.06 | 4 | 221.2 | 154.2 | .825 | 18.72 |
| 143 | 9 | 1.5 | 6.0 | 47.06 | 4 | 240.6 | 154.2 | .758 | 15.54 |
| 143 | 9 | 1.5 | 6.0 | 47.06 | 4 | 203.2 | 154.2 | .829 | 27.17 |
| 143 | 9 | 1.5 | 6.0 | 47.06 | 4 | 226.8 | 154.2 | .792 | 17.32 |
| 143 | 9 | 1.5 | 6.0 | 47.06 | 4 | 241.9 | 154.5 | .755 | 14.45 |
| 143 | 9 | 1.5 | 6.0 | 47.06 | 4 | 221.4 | 154.5 | .825 | 18.74 |
| 143 | 9 | 1.5 | 6.0 | 47.06 | 4 | 241.2 | 154.5 | .757 | 15.48 |
| 143 | 9 | 1.5 | 6.0 | 47.06 | 4 | 203.9 | 154.5 | .829 | 26.91 |
| 143 | 9 | 1.5 | 6.0 | 47.06 | 4 | 227.1 | 154.5 | .791 | 17.29 |
| 143 | 9 | 2.5 | 10.0 | 37.95 | 4 | 266.3 | 154.0 | 1.242 | 9.10 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 143 | 9 | 2.5 | 10.0 | 37.95 | 4 | 241.6 | 154.0 | 1.360 | 11.58 |
| 143 | 9 | 2.5 | 10.0 | 37.95 | 4 | 272.7 | 154.0 | 1.241 | 9.15 |
| 143 | 9 | 2.5 | 10.0 | 37.95 | 4 | 230.4 | 154.0 | 1.361 | 14.10 |
| 143 | 9 | 2.5 | 10.0 | 37.95 | 4 | 252.7 | 154.0 | 1.301 | 10.29 |
| 143 | 9 | 2.5 | 10.0 | 37.95 | 4 | 266.2 | 154.1 | 1.242 | 9.11 |
| 143 | 9 | 2.5 | 10.0 | 37.95 | 4 | 241.3 | 154.1 | 1.360 | 11.62 |
| 143 | 9 | 2.5 | 10.0 | 37.95 | 4 | 272.5 | 154.1 | 1.242 | 9.16 |
| 143 | 9 | 2.5 | 10.0 | 37.95 | 4 | 230.7 | 154.1 | 1.361 | 14.05 |
| 143 | 9 | 2.5 | 10.0 | 37.95 | 4 | 252.7 | 154.1 | 1.301 | 10.30 |
| 143 | 9 | 3.5 | 14.0 | 34.41 | 4 | 285.7 | 154.3 | 1.721 | 7.07 |
| 143 | 9 | 3.5 | 14.0 | 34.41 | 4 | 258.5 | 154.3 | 1.887 | 8.84 |
| 143 | 9 | 3.5 | 14.0 | 34.41 | 4 | 299.5 | 154.3 | 1.713 | 6.79 |
| 143 | 9 | 3.5 | 14.0 | 34.41 | 4 | 251.5 | 154.3 | 1.883 | 10.07 |
| 143 | 9 | 3.5 | 14.0 | 34.41 | 4 | 273.8 | 154.3 | 1.801 | 7.73 |
| 143 | 9 | 3.5 | 14.0 | 34.41 | 4 | 285.6 | 154.3 | 1.721 | 7.07 |
| 143 | 9 | 3.5 | 14.0 | 34.41 | 4 | 258.1 | 154.3 | 1.887 | 8.88 |
| 143 | 9 | 3.5 | 14.0 | 34.41 | 4 | 298.3 | 154.3 | 1.714 | 6.85 |
| 143 | 9 | 3.5 | 14.0 | 34.41 | 4 | 250.9 | 154.3 | 1.884 | 10.13 |
| 143 | 9 | 3.5 | 14.0 | 34.41 | 4 | 273.2 | 154.3 | 1.801 | 7.76 |
| 143 | 9 | 4.5 | 18.0 | 30.31 | 4 | 301.8 | 154.2 | 2.194 | 5.55 |
| 143 | 9 | 4.5 | 18.0 | 30.31 | 4 | 272.5 | 154.2 | 2.408 | 6.87 |
| 143 | 9 | 4.5 | 18.0 | 30.31 | 4 | 319.6 | 154.2 | 2.180 | 5.26 |
| 143 | 9 | 4.5 | 18.0 | 30.31 | 4 | 265.9 | 154.2 | 2.403 | 7.73 |
| 143 | 9 | 4.5 | 18.0 | 30.31 | 4 | 290.0 | 154.2 | 2.295 | 6.00 |
| 143 | 9 | 4.5 | 18.0 | 30.31 | 4 | 301.9 | 154.2 | 2.194 | 5.55 |
| 143 | 9 | 4.5 | 18.0 | 30.31 | 4 | 272.9 | 154.2 | 2.407 | 6.85 |
| 143 | 9 | 4.5 | 18.0 | 30.31 | 4 | 319.5 | 154.2 | 2.180 | 5.27 |
| 143 | 9 | 4.5 | 18.0 | 30.31 | 4 | 266.6 | 154.2 | 2.402 | 7.68 |
| 143 | 9 | 4.5 | 18.0 | 30.31 | 4 | 290.2 | 154.2 | 2.295 | 5.99 |
| 143 | 9 | 5.5 | 22.0 | 31.67 | 4 | 313.9 | 154.1 | 2.665 | 5.37 |
| 143 | 9 | 5.5 | 22.0 | 31.67 | 4 | 283.7 | 154.1 | 2.925 | 6.56 |
| 143 | 9 | 5.5 | 22.0 | 31.67 | 4 | 333.4 | 154.1 | 2.646 | 5.08 |
| 143 | 9 | 5.5 | 22.0 | 31.67 | 4 | 276.3 | 154.1 | 2.921 | 7.40 |
| 143 | 9 | 5.5 | 22.0 | 31.67 | 4 | 301.8 | 154.1 | 2.788 | 5.77 |
| 143 | 9 | 5.5 | 22.0 | 31.67 | 4 | 312.3 | 154.0 | 2.667 | 5.41 |
| 143 | 9 | 5.5 | 22.0 | 31.67 | 4 | 281.8 | 154.0 | 2.928 | 6.66 |
| 143 | 9 | 5.5 | 22.0 | 31.67 | 4 | 332.2 | 154.0 | 2.647 | 5.11 |
| 143 | 9 | 5.5 | 22.0 | 31.67 | 4 | 275.6 | 154.0 | 2.922 | 7.43 |
| 143 | 9 | 5.5 | 22.0 | 31.67 | 4 | 300.5 | 154.0 | 2.790 | 5.82 |
| 144 | 9 | .5 | 2.0 | 72.43 | 4 | 200.6 | 154.1 | .257 | 41.65 |
| 144 | 9 | .5 | 2.0 | 72.43 | 4 | 190.6 | 154.1 | .280 | 52.54 |
| 144 | 9 | .5 | 2.0 | 72.43 | 4 | 195.1 | 154.1 | .259 | 50.16 |
| 144 | 9 | .5 | 2.0 | 72.43 | 4 | 171.1 | 154.1 | .281 | 119.71 |
| 144 | 9 | .5 | 2.0 | 72.43 | 4 | 189.3 | 154.1 | .269 | 54.57 |
| 144 | 9 | .5 | 2.0 | 72.43 | 4 | 199.8 | 152.9 | .258 | 41.30 |
| 144 | 9 | .5 | 2.0 | 72.43 | 4 | 189.8 | 152.9 | .280 | 52.11 |
| 144 | 9 | .5 | 2.0 | 72.43 | 4 | 194.1 | 152.9 | .259 | 49.92 |
| 144 | 9 | .5 | 2.0 | 72.43 | 4 | 170.6 | 152.9 | .282 | 115.22 |
| 144 | 9 | .5 | 2.0 | 72.43 | 4 | 188.6 | 152.9 | .270 | 53.97 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 144 | 9 | 1.5 | 6.0 | 47.36 | 4 | 242.0 | 154.2 | .755 | 14.49 |
| 144 | 9 | 1.5 | 6.0 | 47.36 | 4 | 221.2 | 154.2 | .825 | 18.84 |
| 144 | 9 | 1.5 | 6.0 | 47.36 | 4 | 240.6 | 154.2 | .758 | 15.64 |
| 144 | 9 | 1.5 | 6.0 | 47.36 | 4 | 203.2 | 154.2 | .829 | 27.34 |
| 144 | 9 | 1.5 | 6.0 | 47.36 | 4 | 226.8 | 154.2 | .792 | 17.43 |
| 144 | 9 | 1.5 | 6.0 | 47.36 | 4 | 241.9 | 154.5 | .755 | 14.54 |
| 144 | 9 | 1.5 | 6.0 | 47.36 | 4 | 221.4 | 154.5 | .825 | 18.86 |
| 144 | 9 | 1.5 | 6.0 | 47.36 | 4 | 241.2 | 154.5 | .757 | 15.57 |
| 144 | 9 | 1.5 | 6.0 | 47.36 | 4 | 203.9 | 154.5 | .829 | 27.08 |
| 144 | 9 | 1.5 | 6.0 | 47.36 | 4 | 227.1 | 154.5 | .791 | 17.40 |
| 144 | 9 | 2.5 | 10.0 | 38.14 | 4 | 266.3 | 154.0 | 1.242 | 9.14 |
| 144 | 9 | 2.5 | 10.0 | 38.14 | 4 | 241.6 | 154.0 | 1.360 | 11.64 |
| 144 | 9 | 2.5 | 10.0 | 38.14 | 4 | 272.7 | 154.0 | 1.241 | 9.20 |
| 144 | 9 | 2.5 | 10.0 | 38.14 | 4 | 230.4 | 154.0 | 1.361 | 14.17 |
| 144 | 9 | 2.5 | 10.0 | 38.14 | 4 | 252.7 | 154.0 | 1.301 | 10.34 |
| 144 | 9 | 2.5 | 10.0 | 38.14 | 4 | 266.2 | 154.1 | 1.242 | 9.16 |
| 144 | 9 | 2.5 | 10.0 | 38.14 | 4 | 241.3 | 154.1 | 1.360 | 11.68 |
| 144 | 9 | 2.5 | 10.0 | 38.14 | 4 | 272.5 | 154.1 | 1.242 | 9.21 |
| 144 | 9 | 2.5 | 10.0 | 38.14 | 4 | 230.7 | 154.1 | 1.361 | 14.12 |
| 144 | 9 | 2.5 | 10.0 | 38.14 | 4 | 252.7 | 154.1 | 1.301 | 10.35 |
| 144 | 9 | 3.5 | 14.0 | 34.02 | 4 | 285.7 | 154.3 | 1.721 | 6.99 |
| 144 | 9 | 3.5 | 14.0 | 34.02 | 4 | 258.5 | 154.3 | 1.887 | 8.74 |
| 144 | 9 | 3.5 | 14.0 | 34.02 | 4 | 299.5 | 154.3 | 1.713 | 6.72 |
| 144 | 9 | 3.5 | 14.0 | 34.02 | 4 | 251.5 | 154.3 | 1.883 | 9.95 |
| 144 | 9 | 3.5 | 14.0 | 34.02 | 4 | 273.8 | 154.3 | 1.801 | 7.64 |
| 144 | 9 | 3.5 | 14.0 | 34.02 | 4 | 285.6 | 154.3 | 1.721 | 6.99 |
| 144 | 9 | 3.5 | 14.0 | 34.02 | 4 | 258.1 | 154.3 | 1.887 | 8.78 |
| 144 | 9 | 3.5 | 14.0 | 34.02 | 4 | 298.3 | 154.3 | 1.714 | 6.77 |
| 144 | 9 | 3.5 | 14.0 | 34.02 | 4 | 250.9 | 154.3 | 1.884 | 10.02 |
| 144 | 9 | 3.5 | 14.0 | 34.02 | 4 | 273.2 | 154.3 | 1.801 | 7.68 |
| 144 | 9 | 4.5 | 18.0 | 30.50 | 4 | 301.8 | 154.2 | 2.194 | 5.59 |
| 144 | 9 | 4.5 | 18.0 | 30.50 | 4 | 272.5 | 154.2 | 2.408 | 6.92 |
| 144 | 9 | 4.5 | 18.0 | 30.50 | 4 | 319.6 | 154.2 | 2.180 | 5.30 |
| 144 | 9 | 4.5 | 18.0 | 30.50 | 4 | 265.9 | 154.2 | 2.403 | 7.78 |
| 144 | 9 | 4.5 | 18.0 | 30.50 | 4 | 290.0 | 154.2 | 2.295 | 6.04 |
| 144 | 9 | 4.5 | 18.0 | 30.50 | 4 | 301.9 | 154.2 | 2.194 | 5.58 |
| 144 | 9 | 4.5 | 18.0 | 30.50 | 4 | 272.9 | 154.2 | 2.407 | 6.90 |
| 144 | 9 | 4.5 | 18.0 | 30.50 | 4 | 319.5 | 154.2 | 2.180 | 5.30 |
| 144 | 9 | 4.5 | 18.0 | 30.50 | 4 | 266.6 | 154.2 | 2.402 | 7.73 |
| 144 | 9 | 4.5 | 18.0 | 30.50 | 4 | 290.2 | 154.2 | 2.295 | 6.03 |
| 145 | 9 | .5 | 2.0 | 73.15 | 4 | 200.6 | 154.1 | .257 | 42.06 |
| 145 | 9 | .5 | 2.0 | 73.15 | 4 | 190.6 | 154.1 | .280 | 53.07 |
| 145 | 9 | .5 | 2.0 | 73.15 | 4 | 195.1 | 154.1 | .259 | 50.66 |
| 145 | 9 | .5 | 2.0 | 73.15 | 4 | 171.1 | 154.1 | .281 | 120.91 |
| 145 | 9 | .5 | 2.0 | 73.15 | 4 | 189.3 | 154.1 | .269 | 55.11 |
| 145 | 9 | .5 | 2.0 | 73.15 | 4 | 199.8 | 152.9 | .258 | 41.71 |
| 145 | 9 | .5 | 2.0 | 73.15 | 4 | 189.8 | 152.9 | .280 | 52.63 |
| 145 | 9 | .5 | 2.0 | 73.15 | 4 | 194.1 | 152.9 | .259 | 50.42 |
| 145 | 9 | .5 | 2.0 | 73.15 | 4 | 170.6 | 152.9 | .282 | 116.37 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 145 | 9 | .5 | 2.0 | 73.15 | 4 | 188.6 | 152.9 | .270 | 54.51 |
| 146 | 9 | .5 | 2.0 | 72.58 | 4 | 200.6 | 154.1 | .257 | 41.73 |
| 146 | 9 | .5 | 2.0 | 72.58 | 4 | 190.6 | 154.1 | .280 | 52.65 |
| 146 | 9 | .5 | 2.0 | 72.58 | 4 | 195.1 | 154.1 | .259 | 50.26 |
| 146 | 9 | .5 | 2.0 | 72.58 | 4 | 171.1 | 154.1 | .281 | 119.95 |
| 146 | 9 | .5 | 2.0 | 72.58 | 4 | 189.3 | 154.1 | .269 | 54.68 |
| 146 | 9 | .5 | 2.0 | 72.58 | 4 | 199.8 | 152.9 | .258 | 41.38 |
| 146 | 9 | .5 | 2.0 | 72.58 | 4 | 189.8 | 152.9 | .280 | 52.22 |
| 146 | 9 | .5 | 2.0 | 72.58 | 4 | 194.1 | 152.9 | .259 | 50.02 |
| 146 | 9 | .5 | 2.0 | 72.58 | 4 | 170.6 | 152.9 | .282 | 115.45 |
| 146 | 9 | .5 | 2.0 | 72.58 | 4 | 188.6 | 152.9 | .270 | 54.08 |
| 146 | 9 | 1.5 | 6.0 | 46.56 | 4 | 242.0 | 154.2 | .755 | 14.24 |
| 146 | 9 | 1.5 | 6.0 | 46.56 | 4 | 221.2 | 154.2 | .825 | 18.53 |
| 146 | 9 | 1.5 | 6.0 | 46.56 | 4 | 240.6 | 154.2 | .758 | 15.37 |
| 146 | 9 | 1.5 | 6.0 | 46.56 | 4 | 203.2 | 154.2 | .829 | 26.88 |
| 146 | 9 | 1.5 | 6.0 | 46.56 | 4 | 226.8 | 154.2 | .792 | 17.14 |
| 146 | 9 | 1.5 | 6.0 | 46.56 | 4 | 241.9 | 154.5 | .755 | 14.29 |
| 146 | 9 | 1.5 | 6.0 | 46.56 | 4 | 221.4 | 154.5 | .825 | 18.54 |
| 146 | 9 | 1.5 | 6.0 | 46.56 | 4 | 241.2 | 154.5 | .757 | 15.31 |
| 146 | 9 | 1.5 | 6.0 | 46.56 | 4 | 203.9 | 154.5 | .829 | 26.63 |
| 146 | 9 | 1.5 | 6.0 | 46.56 | 4 | 227.1 | 154.5 | .791 | 17.11 |
| 146 | 9 | 2.5 | 10.0 | 38.17 | 4 | 266.3 | 154.0 | 1.242 | 9.15 |
| 146 | 9 | 2.5 | 10.0 | 38.17 | 4 | 241.6 | 154.0 | 1.360 | 11.64 |
| 146 | 9 | 2.5 | 10.0 | 38.17 | 4 | 272.7 | 154.0 | 1.241 | 9.20 |
| 146 | 9 | 2.5 | 10.0 | 38.17 | 4 | 230.4 | 154.0 | 1.361 | 14.18 |
| 146 | 9 | 2.5 | 10.0 | 38.17 | 4 | 252.7 | 154.0 | 1.301 | 10.35 |
| 146 | 9 | 2.5 | 10.0 | 38.17 | 4 | 266.2 | 154.1 | 1.242 | 9.17 |
| 146 | 9 | 2.5 | 10.0 | 38.17 | 4 | 241.3 | 154.1 | 1.360 | 11.69 |
| 146 | 9 | 2.5 | 10.0 | 38.17 | 4 | 272.5 | 154.1 | 1.242 | 9.22 |
| 146 | 9 | 2.5 | 10.0 | 38.17 | 4 | 230.7 | 154.1 | 1.361 | 14.13 |
| 146 | 9 | 2.5 | 10.0 | 38.17 | 4 | 252.7 | 154.1 | 1.301 | 10.36 |
| 146 | 9 | 3.5 | 14.0 | 34.56 | 4 | 285.7 | 154.3 | 1.721 | 7.10 |
| 146 | 9 | 3.5 | 14.0 | 34.56 | 4 | 258.5 | 154.3 | 1.887 | 8.88 |
| 146 | 9 | 3.5 | 14.0 | 34.56 | 4 | 299.5 | 154.3 | 1.713 | 6.82 |
| 146 | 9 | 3.5 | 14.0 | 34.56 | 4 | 251.5 | 154.3 | 1.883 | 10.11 |
| 146 | 9 | 3.5 | 14.0 | 34.56 | 4 | 273.8 | 154.3 | 1.801 | 7.76 |
| 146 | 9 | 3.5 | 14.0 | 34.56 | 4 | 285.6 | 154.3 | 1.721 | 7.10 |
| 146 | 9 | 3.5 | 14.0 | 34.56 | 4 | 258.1 | 154.3 | 1.887 | 8.91 |
| 146 | 9 | 3.5 | 14.0 | 34.56 | 4 | 298.3 | 154.3 | 1.714 | 6.88 |
| 146 | 9 | 3.5 | 14.0 | 34.56 | 4 | 250.9 | 154.3 | 1.884 | 10.17 |
| 146 | 9 | 3.5 | 14.0 | 34.56 | 4 | 273.2 | 154.3 | 1.801 | 7.80 |
| 146 | 9 | 4.5 | 18.0 | 30.58 | 4 | 301.8 | 154.2 | 2.194 | 5.60 |
| 146 | 9 | 4.5 | 18.0 | 30.58 | 4 | 272.5 | 154.2 | 2.408 | 6.94 |
| 146 | 9 | 4.5 | 18.0 | 30.58 | 4 | 319.6 | 154.2 | 2.180 | 5.31 |
| 146 | 9 | 4.5 | 18.0 | 30.58 | 4 | 265.9 | 154.2 | 2.403 | 7.80 |
| 146 | 9 | 4.5 | 18.0 | 30.58 | 4 | 290.0 | 154.2 | 2.295 | 6.05 |
| 146 | 9 | 4.5 | 18.0 | 30.58 | 4 | 301.9 | 154.2 | 2.194 | 5.60 |
| 146 | 9 | 4.5 | 18.0 | 30.58 | 4 | 272.9 | 154.2 | 2.407 | 6.91 |
| 146 | 9 | 4.5 | 18.0 | 30.58 | 4 | 319.5 | 154.2 | 2.180 | 5.31 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 146 | 9 | 4.5 | 18.0 | 30.58 | 4 | 266.6 | 154.2 | 2.402 | 7.75 |
| 146 | 9 | 4.5 | 18.0 | 30.58 | 4 | 290.2 | 154.2 | 2.295 | 6.04 |
| 146 | 9 | 5.5 | 22.0 | 29.95 | 4 | 313.9 | 154.1 | 2.665 | 5.07 |
| 146 | 9 | 5.5 | 22.0 | 29.95 | 4 | 283.7 | 154.1 | 2.925 | 6.21 |
| 146 | 9 | 5.5 | 22.0 | 29.95 | 4 | 333.4 | 154.1 | 2.646 | 4.80 |
| 146 | 9 | 5.5 | 22.0 | 29.95 | 4 | 276.3 | 154.1 | 2.921 | 6.99 |
| 146 | 9 | 5.5 | 22.0 | 29.95 | 4 | 301.8 | 154.1 | 2.788 | 5.46 |
| 146 | 9 | 5.5 | 22.0 | 29.95 | 4 | 312.3 | 154.0 | 2.667 | 5.12 |
| 146 | 9 | 5.5 | 22.0 | 29.95 | 4 | 281.8 | 154.0 | 2.928 | 6.29 |
| 146 | 9 | 5.5 | 22.0 | 29.95 | 4 | 332.2 | 154.0 | 2.647 | 4.83 |
| 146 | 9 | 5.5 | 22.0 | 29.95 | 4 | 275.6 | 154.0 | 2.922 | 7.03 |
| 146 | 9 | 5.5 | 22.0 | 29.95 | 4 | 300.5 | 154.0 | 2.790 | 5.50 |
| 151 | 9 | 1.0 | 4.0 | 59.43 | 4 | 279.0 | 205.0 | .480 | 21.33 |
| 151 | 9 | 1.0 | 4.0 | 59.43 | 4 | 261.7 | 205.0 | .523 | 27.60 |
| 151 | 9 | 1.0 | 4.0 | 59.43 | 4 | 274.6 | 205.0 | .483 | 24.09 |
| 151 | 9 | 1.0 | 4.0 | 59.43 | 4 | 249.0 | 205.0 | .524 | 37.83 |
| 151 | 9 | 1.0 | 4.0 | 59.43 | 4 | 266.1 | 205.0 | .502 | 25.69 |
| 151 | 9 | 1.0 | 4.0 | 59.43 | 4 | 279.0 | 205.1 | .480 | 21.33 |
| 151 | 9 | 1.0 | 4.0 | 59.43 | 4 | 261.8 | 205.1 | .523 | 27.59 |
| 151 | 9 | 1.0 | 4.0 | 59.43 | 4 | 274.7 | 205.1 | .483 | 24.08 |
| 151 | 9 | 1.0 | 4.0 | 59.43 | 4 | 249.0 | 205.1 | .524 | 37.80 |
| 151 | 9 | 1.0 | 4.0 | 59.43 | 4 | 266.1 | 205.1 | .502 | 25.68 |
| 151 | 9 | 2.0 | 8.0 | 44.57 | 4 | 309.2 | 206.4 | .945 | 11.53 |
| 151 | 9 | 2.0 | 8.0 | 44.57 | 4 | 286.5 | 206.4 | 1.033 | 14.69 |
| 151 | 9 | 2.0 | 8.0 | 44.57 | 4 | 310.5 | 206.4 | .947 | 12.10 |
| 151 | 9 | 2.0 | 8.0 | 44.57 | 4 | 280.8 | 206.4 | 1.030 | 16.80 |
| 151 | 9 | 2.0 | 8.0 | 44.57 | 4 | 296.7 | 206.4 | .989 | 13.05 |
| 151 | 9 | 2.0 | 8.0 | 44.57 | 4 | 309.4 | 206.5 | .945 | 11.53 |
| 151 | 9 | 2.0 | 8.0 | 44.57 | 4 | 286.6 | 206.5 | 1.033 | 14.69 |
| 151 | 9 | 2.0 | 8.0 | 44.57 | 4 | 310.6 | 206.5 | .947 | 12.10 |
| 151 | 9 | 2.0 | 8.0 | 44.57 | 4 | 280.8 | 206.5 | 1.030 | 16.83 |
| 151 | 9 | 2.0 | 8.0 | 44.57 | 4 | 296.9 | 206.5 | .989 | 13.05 |
| 151 | 9 | 5.0 | 20.0 | 30.21 | 4 | 359.7 | 207.6 | 2.304 | 5.31 |
| 151 | 9 | 5.0 | 20.0 | 30.21 | 4 | 331.7 | 207.6 | 2.524 | 6.47 |
| 151 | 9 | 5.0 | 20.0 | 30.21 | 4 | 377.9 | 207.6 | 2.291 | 5.04 |
| 151 | 9 | 5.0 | 20.0 | 30.21 | 4 | 331.3 | 207.6 | 2.511 | 6.89 |
| 151 | 9 | 5.0 | 20.0 | 30.21 | 4 | 350.1 | 207.6 | 2.407 | 5.64 |
| 151 | 9 | 5.0 | 20.0 | 30.21 | 4 | 359.8 | 208.0 | 2.304 | 5.32 |
| 151 | 9 | 5.0 | 20.0 | 30.21 | 4 | 331.9 | 208.0 | 2.523 | 6.47 |
| 151 | 9 | 5.0 | 20.0 | 30.21 | 4 | 378.2 | 208.0 | 2.291 | 5.04 |
| 151 | 9 | 5.0 | 20.0 | 30.21 | 4 | 331.6 | 208.0 | 2.510 | 6.89 |
| 151 | 9 | 5.0 | 20.0 | 30.21 | 4 | 350.4 | 208.0 | 2.406 | 5.64 |
| 152 | 9 | 1.0 | 4.0 | 59.23 | 4 | 279.0 | 205.0 | .480 | 21.26 |
| 152 | 9 | 1.0 | 4.0 | 59.23 | 4 | 261.7 | 205.0 | .523 | 27.51 |
| 152 | 9 | 1.0 | 4.0 | 59.23 | 4 | 274.6 | 205.0 | .483 | 24.00 |
| 152 | 9 | 1.0 | 4.0 | 59.23 | 4 | 249.0 | 205.0 | .524 | 37.70 |
| 152 | 9 | 1.0 | 4.0 | 59.23 | 4 | 266.1 | 205.0 | .502 | 25.60 |
| 152 | 9 | 1.0 | 4.0 | 59.23 | 4 | 279.0 | 205.1 | .480 | 21.26 |
| 152 | 9 | 1.0 | 4.0 | 59.23 | 4 | 261.8 | 205.1 | .523 | 27.49 |

| RUN | NO OF PEL | ETHYLENE CC/SC | HYDROGEN CC/SC | CONVERSION | THERMOCOUPLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 152 | 9 | 1.0 | 4.0 | 59.23 | 4 | 274.7 | 205.1 | .483 | 23.99 |
| 152 | 9 | 1.0 | 4.0 | 59.23 | 4 | 249.0 | 205.1 | .524 | 37.68 |
| 152 | 9 | 1.0 | 4.0 | 59.23 | 4 | 266.1 | 205.1 | .502 | 25.59 |
| 152 | 9 | 2.0 | 8.0 | 44.28 | 4 | 309.2 | 206.4 | .945 | 11.45 |
| 152 | 9 | 2.0 | 8.0 | 44.28 | 4 | 286.5 | 206.4 | 1.033 | 14.60 |
| 152 | 9 | 2.0 | 8.0 | 44.28 | 4 | 310.5 | 206.4 | .947 | 12.02 |
| 152 | 9 | 2.0 | 8.0 | 44.28 | 4 | 280.8 | 206.4 | 1.030 | 16.69 |
| 152 | 9 | 2.0 | 8.0 | 44.28 | 4 | 296.7 | 206.4 | .989 | 12.96 |
| 152 | 9 | 2.0 | 8.0 | 44.28 | 4 | 309.4 | 206.5 | .945 | 11.45 |
| 152 | 9 | 2.0 | 8.0 | 44.28 | 4 | 286.6 | 206.5 | 1.033 | 14.60 |
| 152 | 9 | 2.0 | 8.0 | 44.28 | 4 | 310.6 | 206.5 | .947 | 12.02 |
| 152 | 9 | 2.0 | 8.0 | 44.28 | 4 | 280.8 | 206.5 | 1.030 | 16.72 |
| 152 | 9 | 2.0 | 8.0 | 44.28 | 4 | 296.9 | 206.5 | .989 | 12.97 |
| 152 | 9 | 5.0 | 20.0 | 29.92 | 4 | 359.7 | 207.6 | 2.304 | 5.26 |
| 152 | 9 | 5.0 | 20.0 | 29.92 | 4 | 331.7 | 207.6 | 2.524 | 6.40 |
| 152 | 9 | 5.0 | 20.0 | 29.92 | 4 | 377.9 | 207.6 | 2.291 | 4.99 |
| 152 | 9 | 5.0 | 20.0 | 29.92 | 4 | 331.3 | 207.6 | 2.511 | 6.82 |
| 152 | 9 | 5.0 | 20.0 | 29.92 | 4 | 350.1 | 207.6 | 2.407 | 5.58 |
| 152 | 9 | 5.0 | 20.0 | 29.92 | 4 | 359.8 | 208.0 | 2.304 | 5.27 |
| 152 | 9 | 5.0 | 20.0 | 29.92 | 4 | 331.9 | 208.0 | 2.523 | 6.41 |
| 152 | 9 | 5.0 | 20.0 | 29.92 | 4 | 378.2 | 208.0 | 2.291 | 4.99 |
| 152 | 9 | 5.0 | 20.0 | 29.92 | 4 | 331.6 | 208.0 | 2.510 | 6.82 |
| 152 | 9 | 5.0 | 20.0 | 29.92 | 4 | 350.4 | 208.0 | 2.406 | 5.59 |
| 153 | 9 | 1.0 | 4.0 | 59.64 | 4 | 279.0 | 205.0 | .480 | 21.40 |
| 153 | 9 | 1.0 | 4.0 | 59.64 | 4 | 261.7 | 205.0 | .523 | 27.70 |
| 153 | 9 | 1.0 | 4.0 | 59.64 | 4 | 274.6 | 205.0 | .483 | 24.17 |
| 153 | 9 | 1.0 | 4.0 | 59.64 | 4 | 249.0 | 205.0 | .524 | 37.96 |
| 153 | 9 | 1.0 | 4.0 | 59.64 | 4 | 266.1 | 205.0 | .502 | 25.78 |
| 153 | 9 | 1.0 | 4.0 | 59.64 | 4 | 279.0 | 205.1 | .480 | 21.40 |
| 153 | 9 | 1.0 | 4.0 | 59.64 | 4 | 261.8 | 205.1 | .523 | 27.68 |
| 153 | 9 | 1.0 | 4.0 | 59.64 | 4 | 274.7 | 205.1 | .483 | 24.16 |
| 153 | 9 | 1.0 | 4.0 | 59.64 | 4 | 249.0 | 205.1 | .524 | 37.93 |
| 153 | 9 | 1.0 | 4.0 | 59.64 | 4 | 266.1 | 205.1 | .502 | 25.77 |
| 153 | 9 | 2.0 | 8.0 | 44.48 | 4 | 309.2 | 206.4 | .945 | 11.51 |
| 153 | 9 | 2.0 | 8.0 | 44.48 | 4 | 286.5 | 206.4 | 1.033 | 14.66 |
| 153 | 9 | 2.0 | 8.0 | 44.48 | 4 | 310.5 | 206.4 | .947 | 12.08 |
| 153 | 9 | 2.0 | 8.0 | 44.48 | 4 | 280.8 | 206.4 | 1.030 | 16.77 |
| 153 | 9 | 2.0 | 8.0 | 44.48 | 4 | 296.7 | 206.4 | .989 | 13.02 |
| 153 | 9 | 2.0 | 8.0 | 44.48 | 4 | 309.4 | 206.5 | .945 | 11.51 |
| 153 | 9 | 2.0 | 8.0 | 44.48 | 4 | 286.6 | 206.5 | 1.033 | 14.66 |
| 153 | 9 | 2.0 | 8.0 | 44.48 | 4 | 310.6 | 206.5 | .947 | 12.08 |
| 153 | 9 | 2.0 | 8.0 | 44.48 | 4 | 280.8 | 206.5 | 1.030 | 16.79 |
| 153 | 9 | 2.0 | 8.0 | 44.48 | 4 | 296.9 | 206.5 | .989 | 13.03 |
| 153 | 9 | 5.0 | 20.0 | 30.11 | 4 | 359.7 | 207.6 | 2.304 | 5.30 |
| 153 | 9 | 5.0 | 20.0 | 30.11 | 4 | 331.7 | 207.6 | 2.524 | 6.44 |
| 153 | 9 | 5.0 | 20.0 | 30.11 | 4 | 377.9 | 207.6 | 2.291 | 5.03 |
| 153 | 9 | 5.0 | 20.0 | 30.11 | 4 | 331.3 | 207.6 | 2.511 | 6.87 |
| 153 | 9 | 5.0 | 20.0 | 30.11 | 4 | 350.1 | 207.6 | 2.407 | 5.62 |
| 153 | 9 | 5.0 | 20.0 | 30.11 | 4 | 359.8 | 208.0 | 2.304 | 5.30 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 153 | 9 | 5.0 | 20.0 | 30.11 | 4 | 331.9 | 208.0 | 2.523 | 6.45 |
| 153 | 9 | 5.0 | 20.0 | 30.11 | 4 | 378.2 | 208.0 | 2.291 | 5.03 |
| 153 | 9 | 5.0 | 20.0 | 30.11 | 4 | 331.6 | 208.0 | 2.510 | 6.87 |
| 153 | 9 | 5.0 | 20.0 | 30.11 | 4 | 350.4 | 208.0 | 2.406 | 5.62 |
| 154 | 9 | 1.0 | 4.0 | 59.53 | 4 | 279.0 | 205.0 | .480 | 21.37 |
| 154 | 9 | 1.0 | 4.0 | 59.53 | 4 | 261.7 | 205.0 | .523 | 27.65 |
| 154 | 9 | 1.0 | 4.0 | 59.53 | 4 | 274.6 | 205.0 | .483 | 24.13 |
| 154 | 9 | 1.0 | 4.0 | 59.53 | 4 | 249.0 | 205.0 | .524 | 37.90 |
| 154 | 9 | 1.0 | 4.0 | 59.53 | 4 | 266.1 | 205.0 | .502 | 25.74 |
| 154 | 9 | 1.0 | 4.0 | 59.53 | 4 | 279.0 | 205.1 | .480 | 21.37 |
| 154 | 9 | 1.0 | 4.0 | 59.53 | 4 | 261.8 | 205.1 | .523 | 27.63 |
| 154 | 9 | 1.0 | 4.0 | 59.53 | 4 | 274.7 | 205.1 | .483 | 24.12 |
| 154 | 9 | 1.0 | 4.0 | 59.53 | 4 | 249.0 | 205.1 | .524 | 37.87 |
| 154 | 9 | 1.0 | 4.0 | 59.53 | 4 | 266.1 | 205.1 | .502 | 25.73 |
| 154 | 9 | 2.0 | 8.0 | 44.67 | 4 | 309.2 | 206.4 | .945 | 11.56 |
| 154 | 9 | 2.0 | 8.0 | 44.67 | 4 | 286.5 | 206.4 | 1.033 | 14.73 |
| 154 | 9 | 2.0 | 8.0 | 44.67 | 4 | 310.5 | 206.4 | .947 | 12.13 |
| 154 | 9 | 2.0 | 8.0 | 44.67 | 4 | 280.8 | 206.4 | 1.030 | 16.84 |
| 154 | 9 | 2.0 | 8.0 | 44.67 | 4 | 296.7 | 206.4 | .989 | 13.08 |
| 154 | 9 | 2.0 | 8.0 | 44.67 | 4 | 309.4 | 206.5 | .945 | 11.56 |
| 154 | 9 | 2.0 | 8.0 | 44.67 | 4 | 286.6 | 206.5 | 1.033 | 14.73 |
| 154 | 9 | 2.0 | 8.0 | 44.67 | 4 | 310.6 | 206.5 | .947 | 12.13 |
| 154 | 9 | 2.0 | 8.0 | 44.67 | 4 | 280.8 | 206.5 | 1.030 | 16.87 |
| 154 | 9 | 2.0 | 8.0 | 44.67 | 4 | 296.9 | 206.5 | .989 | 13.08 |
| 154 | 9 | 5.0 | 20.0 | 30.02 | 4 | 359.7 | 207.6 | 2.304 | 5.28 |
| 154 | 9 | 5.0 | 20.0 | 30.02 | 4 | 331.7 | 207.6 | 2.524 | 6.42 |
| 154 | 9 | 5.0 | 20.0 | 30.02 | 4 | 377.9 | 207.6 | 2.291 | 5.01 |
| 154 | 9 | 5.0 | 20.0 | 30.02 | 4 | 331.3 | 207.6 | 2.511 | 6.84 |
| 154 | 9 | 5.0 | 20.0 | 30.02 | 4 | 350.1 | 207.6 | 2.407 | 5.60 |
| 154 | 9 | 5.0 | 20.0 | 30.02 | 4 | 359.8 | 208.0 | 2.304 | 5.29 |
| 154 | 9 | 5.0 | 20.0 | 30.02 | 4 | 331.9 | 208.0 | 2.523 | 6.43 |
| 154 | 9 | 5.0 | 20.0 | 30.02 | 4 | 378.2 | 208.0 | 2.291 | 5.01 |
| 154 | 9 | 5.0 | 20.0 | 30.02 | 4 | 331.6 | 208.0 | 2.510 | 6.84 |
| 154 | 9 | 5.0 | 20.0 | 30.02 | 4 | 350.4 | 208.0 | 2.406 | 5.61 |
| 155 | 9 | 1.0 | 4.0 | 59.46 | 4 | 279.0 | 205.0 | .480 | 21.34 |
| 155 | 9 | 1.0 | 4.0 | 59.46 | 4 | 261.7 | 205.0 | .523 | 27.61 |
| 155 | 9 | 1.0 | 4.0 | 59.46 | 4 | 274.6 | 205.0 | .483 | 24.10 |
| 155 | 9 | 1.0 | 4.0 | 59.46 | 4 | 249.0 | 205.0 | .524 | 37.85 |
| 155 | 9 | 1.0 | 4.0 | 59.46 | 4 | 266.1 | 205.0 | .502 | 25.70 |
| 155 | 9 | 1.0 | 4.0 | 59.46 | 4 | 279.0 | 205.1 | .480 | 21.34 |
| 155 | 9 | 1.0 | 4.0 | 59.46 | 4 | 261.8 | 205.1 | .523 | 27.60 |
| 155 | 9 | 1.0 | 4.0 | 59.46 | 4 | 274.7 | 205.1 | .483 | 24.09 |
| 155 | 9 | 1.0 | 4.0 | 59.46 | 4 | 249.0 | 205.1 | .524 | 37.82 |
| 155 | 9 | 1.0 | 4.0 | 59.46 | 4 | 266.1 | 205.1 | .502 | 25.69 |
| 155 | 9 | 2.0 | 8.0 | 44.50 | 4 | 309.2 | 206.4 | .945 | 11.51 |
| 155 | 9 | 2.0 | 8.0 | 44.50 | 4 | 286.5 | 206.4 | 1.033 | 14.67 |
| 155 | 9 | 2.0 | 8.0 | 44.50 | 4 | 310.5 | 206.4 | .947 | 12.08 |
| 155 | 9 | 2.0 | 8.0 | 44.50 | 4 | 280.8 | 206.4 | 1.030 | 16.77 |
| 155 | 9 | 2.0 | 8.0 | 44.50 | 4 | 296.7 | 206.4 | .989 | 13.03 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 155 | 9 | 2.0 | 8.0 | 44.50 | 4 | 309.4 | 206.5 | .945 | 11.51 |
| 155 | 9 | 2.0 | 8.0 | 44.50 | 4 | 286.6 | 206.5 | 1.033 | 14.67 |
| 155 | 9 | 2.0 | 8.0 | 44.50 | 4 | 310.6 | 206.5 | .947 | 12.08 |
| 155 | 9 | 2.0 | 8.0 | 44.50 | 4 | 280.8 | 206.5 | 1.030 | 16.80 |
| 155 | 9 | 2.0 | 8.0 | 44.50 | 4 | 296.9 | 206.5 | .989 | 13.03 |
| 155 | 9 | 5.0 | 20.0 | 30.07 | 4 | 359.7 | 207.6 | 2.304 | 5.29 |
| 155 | 9 | 5.0 | 20.0 | 30.07 | 4 | 331.7 | 207.6 | 2.524 | 6.43 |
| 155 | 9 | 5.0 | 20.0 | 30.07 | 4 | 377.9 | 207.6 | 2.291 | 5.02 |
| 155 | 9 | 5.0 | 20.0 | 30.07 | 4 | 331.3 | 207.6 | 2.511 | 6.85 |
| 155 | 9 | 5.0 | 20.0 | 30.07 | 4 | 350.1 | 207.6 | 2.407 | 5.61 |
| 155 | 9 | 5.0 | 20.0 | 30.07 | 4 | 359.8 | 208.0 | 2.304 | 5.29 |
| 155 | 9 | 5.0 | 20.0 | 30.07 | 4 | 331.9 | 208.0 | 2.523 | 6.44 |
| 155 | 9 | 5.0 | 20.0 | 30.07 | 4 | 378.2 | 208.0 | 2.291 | 5.02 |
| 155 | 9 | 5.0 | 20.0 | 30.07 | 4 | 331.6 | 208.0 | 2.510 | 6.85 |
| 155 | 9 | 5.0 | 20.0 | 30.07 | 4 | 350.4 | 208.0 | 2.406 | 5.61 |
| 181 | 3 | 1.0 | 4.0 | 18.87 | 2 | 255.2 | 199.9 | .490 | 26.98 |
| 181 | 3 | 1.0 | 4.0 | 18.87 | 2 | 248.0 | 199.9 | .480 | 30.65 |
| 181 | 3 | 1.0 | 4.0 | 18.87 | 2 | 251.6 | 199.9 | .496 | 28.56 |
| 181 | 3 | 1.0 | 4.0 | 18.87 | 2 | 256.1 | 199.5 | .490 | 26.35 |
| 181 | 3 | 1.0 | 4.0 | 18.87 | 2 | 248.0 | 199.5 | .480 | 30.43 |
| 181 | 3 | 1.0 | 4.0 | 18.87 | 2 | 252.1 | 199.5 | .496 | 28.11 |
| 181 | 3 | 1.0 | 4.0 | 18.87 | 2 | 256.9 | 199.5 | .489 | 26.01 |
| 181 | 3 | 1.0 | 4.0 | 18.87 | 2 | 248.0 | 199.5 | .480 | 30.37 |
| 181 | 3 | 1.0 | 4.0 | 18.87 | 2 | 252.4 | 199.5 | .495 | 27.88 |
| 181 | 3 | 1.5 | 6.0 | 13.53 | 2 | 273.0 | 201.1 | .728 | 14.91 |
| 181 | 3 | 1.5 | 6.0 | 13.53 | 2 | 263.3 | 201.1 | .714 | 17.03 |
| 181 | 3 | 1.5 | 6.0 | 13.53 | 2 | 268.2 | 201.1 | .737 | 15.82 |
| 181 | 3 | 1.5 | 6.0 | 13.53 | 2 | 273.5 | 201.1 | .727 | 14.80 |
| 181 | 3 | 1.5 | 6.0 | 13.53 | 2 | 263.7 | 201.1 | .714 | 16.90 |
| 181 | 3 | 1.5 | 6.0 | 13.53 | 2 | 268.6 | 201.1 | .737 | 15.70 |
| 181 | 3 | 1.5 | 6.0 | 13.53 | 2 | 271.0 | 200.4 | .729 | 15.17 |
| 181 | 3 | 1.5 | 6.0 | 13.53 | 2 | 260.7 | 200.4 | .715 | 17.57 |
| 181 | 3 | 1.5 | 6.0 | 13.53 | 2 | 265.9 | 200.4 | .738 | 16.20 |
| 181 | 3 | 2.0 | 8.0 | 13.54 | 2 | 283.6 | 201.4 | .965 | 13.05 |
| 181 | 3 | 2.0 | 8.0 | 13.54 | 2 | 273.3 | 201.4 | .947 | 14.75 |
| 181 | 3 | 2.0 | 8.0 | 13.54 | 2 | 278.5 | 201.4 | .977 | 13.78 |
| 181 | 3 | 2.0 | 8.0 | 13.54 | 2 | 283.9 | 201.2 | .965 | 12.98 |
| 181 | 3 | 2.0 | 8.0 | 13.54 | 2 | 273.6 | 201.2 | .947 | 14.65 |
| 181 | 3 | 2.0 | 8.0 | 13.54 | 2 | 278.8 | 201.2 | .977 | 13.70 |
| 181 | 3 | 2.0 | 8.0 | 13.54 | 2 | 284.1 | 201.6 | .965 | 13.01 |
| 181 | 3 | 2.0 | 8.0 | 13.54 | 2 | 273.6 | 201.6 | .947 | 14.74 |
| 181 | 3 | 2.0 | 8.0 | 13.54 | 2 | 278.8 | 201.6 | .977 | 13.76 |
| 181 | 3 | 2.5 | 10.0 | 11.97 | 2 | 292.4 | 202.1 | 1.200 | 10.51 |
| 181 | 3 | 2.5 | 10.0 | 11.97 | 2 | 281.1 | 202.1 | 1.179 | 11.87 |
| 181 | 3 | 2.5 | 10.0 | 11.97 | 2 | 286.8 | 202.1 | 1.216 | 11.09 |
| 181 | 3 | 2.5 | 10.0 | 11.97 | 2 | 293.1 | 202.6 | 1.200 | 10.49 |
| 181 | 3 | 2.5 | 10.0 | 11.97 | 2 | 281.8 | 202.6 | 1.178 | 11.85 |
| 181 | 3 | 2.5 | 10.0 | 11.97 | 2 | 287.4 | 202.6 | 1.215 | 11.07 |
| 181 | 3 | 2.5 | 10.0 | 11.97 | 2 | 293.7 | 202.5 | 1.199 | 10.41 |

| RUN | NO OF PEL | ETHYLENE CC/SC | HYDROGEN CC/SC | CONVERSION | THERMOCOUPLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 181 | 3 | 2.5 | 10.0 | 11.97 | 2 | 282.3 | 202.5 | 1.178 | 11.77 |
| 181 | 3 | 2.5 | 10.0 | 11.97 | 2 | 288.0 | 202.5 | 1.215 | 11.00 |
| 181 | 3 | 3.5 | 14.0 | 10.74 | 2 | 310.3 | 203.1 | 1.665 | 7.96 |
| 181 | 3 | 3.5 | 14.0 | 10.74 | 2 | 296.4 | 203.1 | 1.637 | 9.04 |
| 181 | 3 | 3.5 | 14.0 | 10.74 | 2 | 303.4 | 203.1 | 1.687 | 8.43 |
| 181 | 3 | 3.5 | 14.0 | 10.74 | 2 | 310.7 | 203.4 | 1.664 | 7.95 |
| 181 | 3 | 3.5 | 14.0 | 10.74 | 2 | 296.7 | 203.4 | 1.636 | 9.04 |
| 181 | 3 | 3.5 | 14.0 | 10.74 | 2 | 303.7 | 203.4 | 1.686 | 8.42 |
| 181 | 3 | 3.5 | 14.0 | 10.74 | 2 | 317.8 | 203.8 | 1.658 | 7.49 |
| 181 | 3 | 3.5 | 14.0 | 10.74 | 2 | 297.5 | 203.8 | 1.635 | 9.01 |
| 181 | 3 | 3.5 | 14.0 | 10.74 | 2 | 307.7 | 203.8 | 1.683 | 8.14 |
| 181 | 3 | 4.5 | 18.0 | 9.13 | 2 | 323.7 | 202.9 | 2.126 | 6.01 |
| 181 | 3 | 4.5 | 18.0 | 9.13 | 2 | 306.3 | 202.9 | 2.094 | 6.94 |
| 181 | 3 | 4.5 | 18.0 | 9.13 | 2 | 315.0 | 202.9 | 2.157 | 6.41 |
| 181 | 3 | 4.5 | 18.0 | 9.13 | 2 | 323.8 | 202.8 | 2.126 | 6.00 |
| 181 | 3 | 4.5 | 18.0 | 9.13 | 2 | 307.5 | 202.8 | 2.093 | 6.85 |
| 181 | 3 | 4.5 | 18.0 | 9.13 | 2 | 315.6 | 202.8 | 2.156 | 6.37 |
| 181 | 3 | 4.5 | 18.0 | 9.13 | 2 | 323.9 | 202.5 | 2.126 | 5.98 |
| 181 | 3 | 4.5 | 18.0 | 9.13 | 2 | 306.4 | 202.5 | 2.094 | 6.91 |
| 181 | 3 | 4.5 | 18.0 | 9.13 | 2 | 315.2 | 202.5 | 2.157 | 6.38 |
| 181 | 3 | 5.5 | 22.0 | 8.16 | 2 | 339.1 | 202.4 | 2.580 | 4.76 |
| 181 | 3 | 5.5 | 22.0 | 8.16 | 2 | 319.0 | 202.4 | 2.544 | 5.52 |
| 181 | 3 | 5.5 | 22.0 | 8.16 | 2 | 329.0 | 202.4 | 2.618 | 5.08 |
| 181 | 3 | 5.5 | 22.0 | 8.16 | 2 | 338.5 | 202.4 | 2.581 | 4.78 |
| 181 | 3 | 5.5 | 22.0 | 8.16 | 2 | 318.5 | 202.4 | 2.545 | 5.53 |
| 181 | 3 | 5.5 | 22.0 | 8.16 | 2 | 328.5 | 202.4 | 2.619 | 5.10 |
| 181 | 3 | 5.5 | 22.0 | 8.16 | 2 | 339.1 | 202.7 | 2.579 | 4.77 |
| 181 | 3 | 5.5 | 22.0 | 8.16 | 2 | 319.2 | 202.7 | 2.543 | 5.52 |
| 181 | 3 | 5.5 | 22.0 | 8.16 | 2 | 329.2 | 202.7 | 2.618 | 5.09 |
| 182 | 3 | 1.0 | 4.0 | 18.86 | 2 | 255.2 | 199.9 | .490 | 26.97 |
| 182 | 3 | 1.0 | 4.0 | 18.86 | 2 | 248.0 | 199.9 | .480 | 30.64 |
| 182 | 3 | 1.0 | 4.0 | 18.86 | 2 | 251.6 | 199.9 | .496 | 28.55 |
| 182 | 3 | 1.0 | 4.0 | 18.86 | 2 | 256.1 | 199.5 | .490 | 26.34 |
| 182 | 3 | 1.0 | 4.0 | 18.86 | 2 | 248.0 | 199.5 | .480 | 30.43 |
| 182 | 3 | 1.0 | 4.0 | 18.86 | 2 | 252.1 | 199.5 | .496 | 28.10 |
| 182 | 3 | 1.0 | 4.0 | 18.86 | 2 | 256.9 | 199.5 | .489 | 26.00 |
| 182 | 3 | 1.0 | 4.0 | 18.86 | 2 | 248.0 | 199.5 | .480 | 30.37 |
| 182 | 3 | 1.0 | 4.0 | 18.86 | 2 | 252.4 | 199.5 | .495 | 27.88 |
| 182 | 3 | 1.5 | 6.0 | 15.09 | 2 | 273.0 | 201.1 | .728 | 16.63 |
| 182 | 3 | 1.5 | 6.0 | 15.09 | 2 | 263.3 | 201.1 | .714 | 18.99 |
| 182 | 3 | 1.5 | 6.0 | 15.09 | 2 | 268.2 | 201.1 | .737 | 17.65 |
| 182 | 3 | 1.5 | 6.0 | 15.09 | 2 | 273.5 | 201.1 | .727 | 16.51 |
| 182 | 3 | 1.5 | 6.0 | 15.09 | 2 | 263.7 | 201.1 | .714 | 18.85 |
| 182 | 3 | 1.5 | 6.0 | 15.09 | 2 | 268.6 | 201.1 | .737 | 17.51 |
| 182 | 3 | 1.5 | 6.0 | 15.09 | 2 | 271.0 | 200.4 | .729 | 16.92 |
| 182 | 3 | 1.5 | 6.0 | 15.09 | 2 | 260.7 | 200.4 | .715 | 19.59 |
| 182 | 3 | 1.5 | 6.0 | 15.09 | 2 | 265.9 | 200.4 | .738 | 18.07 |
| 182 | 3 | 2.0 | 8.0 | 13.22 | 2 | 283.6 | 201.4 | .965 | 12.74 |
| 182 | 3 | 2.0 | 8.0 | 13.22 | 2 | 273.3 | 201.4 | .947 | 14.40 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 182 | 3 | 2.0 | 8.0 | 13.22 | 2 | 278.5 | 201.4 | .977 | 13.45 |
| 182 | 3 | 2.0 | 8.0 | 13.22 | 2 | 283.9 | 201.2 | .965 | 12.67 |
| 182 | 3 | 2.0 | 8.0 | 13.22 | 2 | 273.6 | 201.2 | .947 | 14.30 |
| 182 | 3 | 2.0 | 8.0 | 13.22 | 2 | 278.8 | 201.2 | .977 | 13.37 |
| 182 | 3 | 2.0 | 8.0 | 13.22 | 2 | 284.1 | 201.6 | .965 | 12.71 |
| 182 | 3 | 2.0 | 8.0 | 13.22 | 2 | 273.6 | 201.6 | .947 | 14.39 |
| 182 | 3 | 2.0 | 8.0 | 13.22 | 2 | 278.8 | 201.6 | .977 | 13.43 |
| 182 | 3 | 2.5 | 10.0 | 12.90 | 2 | 292.4 | 202.1 | 1.200 | 11.33 |
| 182 | 3 | 2.5 | 10.0 | 12.90 | 2 | 281.1 | 202.1 | 1.179 | 12.80 |
| 182 | 3 | 2.5 | 10.0 | 12.90 | 2 | 286.8 | 202.1 | 1.216 | 11.96 |
| 182 | 3 | 2.5 | 10.0 | 12.90 | 2 | 293.1 | 202.6 | 1.200 | 11.31 |
| 182 | 3 | 2.5 | 10.0 | 12.90 | 2 | 281.8 | 202.6 | 1.178 | 12.77 |
| 182 | 3 | 2.5 | 10.0 | 12.90 | 2 | 287.4 | 202.6 | 1.215 | 11.94 |
| 182 | 3 | 2.5 | 10.0 | 12.90 | 2 | 293.7 | 202.5 | 1.199 | 11.23 |
| 182 | 3 | 2.5 | 10.0 | 12.90 | 2 | 282.3 | 202.5 | 1.178 | 12.69 |
| 182 | 3 | 2.5 | 10.0 | 12.90 | 2 | 288.0 | 202.5 | 1.215 | 11.86 |
| 182 | 3 | 3.5 | 14.0 | 10.53 | 2 | 310.3 | 203.1 | 1.665 | 7.80 |
| 182 | 3 | 3.5 | 14.0 | 10.53 | 2 | 296.4 | 203.1 | 1.637 | 8.86 |
| 182 | 3 | 3.5 | 14.0 | 10.53 | 2 | 303.4 | 203.1 | 1.687 | 8.26 |
| 182 | 3 | 3.5 | 14.0 | 10.53 | 2 | 310.7 | 203.4 | 1.664 | 7.79 |
| 182 | 3 | 3.5 | 14.0 | 10.53 | 2 | 296.7 | 203.4 | 1.636 | 8.86 |
| 182 | 3 | 3.5 | 14.0 | 10.53 | 2 | 303.7 | 203.4 | 1.686 | 8.25 |
| 182 | 3 | 3.5 | 14.0 | 10.53 | 2 | 317.8 | 203.8 | 1.658 | 7.34 |
| 182 | 3 | 3.5 | 14.0 | 10.53 | 2 | 297.5 | 203.8 | 1.635 | 8.83 |
| 182 | 3 | 3.5 | 14.0 | 10.53 | 2 | 307.7 | 203.8 | 1.683 | 7.97 |
| 182 | 3 | 4.5 | 18.0 | 8.67 | 2 | 323.7 | 202.9 | 2.126 | 5.71 |
| 182 | 3 | 4.5 | 18.0 | 8.67 | 2 | 306.3 | 202.9 | 2.094 | 6.59 |
| 182 | 3 | 4.5 | 18.0 | 8.67 | 2 | 315.0 | 202.9 | 2.157 | 6.09 |
| 182 | 3 | 4.5 | 18.0 | 8.67 | 2 | 323.8 | 202.8 | 2.126 | 5.70 |
| 182 | 3 | 4.5 | 18.0 | 8.67 | 2 | 307.5 | 202.8 | 2.093 | 6.51 |
| 182 | 3 | 4.5 | 18.0 | 8.67 | 2 | 315.6 | 202.8 | 2.156 | 6.05 |
| 182 | 3 | 4.5 | 18.0 | 8.67 | 2 | 323.9 | 202.5 | 2.126 | 5.68 |
| 182 | 3 | 4.5 | 18.0 | 8.67 | 2 | 306.4 | 202.5 | 2.094 | 6.56 |
| 182 | 3 | 4.5 | 18.0 | 8.67 | 2 | 315.2 | 202.5 | 2.157 | 6.06 |
| 182 | 3 | 5.5 | 22.0 | 7.65 | 2 | 339.1 | 202.4 | 2.580 | 4.46 |
| 182 | 3 | 5.5 | 22.0 | 7.65 | 2 | 319.0 | 202.4 | 2.544 | 5.17 |
| 182 | 3 | 5.5 | 22.0 | 7.65 | 2 | 329.0 | 202.4 | 2.618 | 4.77 |
| 182 | 3 | 5.5 | 22.0 | 7.65 | 2 | 338.5 | 202.4 | 2.581 | 4.48 |
| 182 | 3 | 5.5 | 22.0 | 7.65 | 2 | 318.5 | 202.4 | 2.545 | 5.19 |
| 182 | 3 | 5.5 | 22.0 | 7.65 | 2 | 328.5 | 202.4 | 2.619 | 4.79 |
| 182 | 3 | 5.5 | 22.0 | 7.65 | 2 | 339.1 | 202.7 | 2.579 | 4.47 |
| 182 | 3 | 5.5 | 22.0 | 7.65 | 2 | 319.2 | 202.7 | 2.543 | 5.17 |
| 182 | 3 | 5.5 | 22.0 | 7.65 | 2 | 329.2 | 202.7 | 2.618 | 4.77 |
| 183 | 3 | 1.0 | 4.0 | 19.23 | 2 | 255.2 | 199.9 | .490 | 27.49 |
| 183 | 3 | 1.0 | 4.0 | 19.23 | 2 | 248.0 | 199.9 | .480 | 31.24 |
| 183 | 3 | 1.0 | 4.0 | 19.23 | 2 | 251.6 | 199.9 | .496 | 29.11 |
| 183 | 3 | 1.0 | 4.0 | 19.23 | 2 | 256.1 | 199.5 | .490 | 26.86 |
| 183 | 3 | 1.0 | 4.0 | 19.23 | 2 | 248.0 | 199.5 | .480 | 31.02 |
| 183 | 3 | 1.0 | 4.0 | 19.23 | 2 | 252.1 | 199.5 | .496 | 28.65 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 183 | 3 | 1.0 | 4.0 | 19.23 | 2 | 256.9 | 199.5 | .489 | 26.51 |
| 183 | 3 | 1.0 | 4.0 | 19.23 | 2 | 248.0 | 199.5 | .480 | 30.96 |
| 183 | 3 | 1.0 | 4.0 | 19.23 | 2 | 252.4 | 199.5 | .495 | 28.42 |
| 183 | 3 | 1.5 | 6.0 | 15.29 | 2 | 273.0 | 201.1 | .728 | 16.85 |
| 183 | 3 | 1.5 | 6.0 | 15.29 | 2 | 263.3 | 201.1 | .714 | 19.24 |
| 183 | 3 | 1.5 | 6.0 | 15.29 | 2 | 268.2 | 201.1 | .737 | 17.88 |
| 183 | 3 | 1.5 | 6.0 | 15.29 | 2 | 273.5 | 201.1 | .727 | 16.72 |
| 183 | 3 | 1.5 | 6.0 | 15.29 | 2 | 263.7 | 201.1 | .714 | 19.10 |
| 183 | 3 | 1.5 | 6.0 | 15.29 | 2 | 268.6 | 201.1 | .737 | 17.75 |
| 183 | 3 | 1.5 | 6.0 | 15.29 | 2 | 271.0 | 200.4 | .729 | 17.14 |
| 183 | 3 | 1.5 | 6.0 | 15.29 | 2 | 260.7 | 200.4 | .715 | 19.85 |
| 183 | 3 | 1.5 | 6.0 | 15.29 | 2 | 265.9 | 200.4 | .738 | 18.31 |
| 183 | 3 | 2.0 | 8.0 | 13.39 | 2 | 283.6 | 201.4 | .965 | 12.91 |
| 183 | 3 | 2.0 | 8.0 | 13.39 | 2 | 273.3 | 201.4 | .947 | 14.59 |
| 183 | 3 | 2.0 | 8.0 | 13.39 | 2 | 278.5 | 201.4 | .977 | 13.63 |
| 183 | 3 | 2.0 | 8.0 | 13.39 | 2 | 283.9 | 201.2 | .965 | 12.84 |
| 183 | 3 | 2.0 | 8.0 | 13.39 | 2 | 273.6 | 201.2 | .947 | 14.49 |
| 183 | 3 | 2.0 | 8.0 | 13.39 | 2 | 278.8 | 201.2 | .977 | 13.55 |
| 183 | 3 | 2.0 | 8.0 | 13.39 | 2 | 284.1 | 201.6 | .965 | 12.88 |
| 183 | 3 | 2.0 | 8.0 | 13.39 | 2 | 273.6 | 201.6 | .947 | 14.58 |
| 183 | 3 | 2.0 | 8.0 | 13.39 | 2 | 278.8 | 201.6 | .977 | 13.61 |
| 183 | 3 | 2.5 | 10.0 | 12.25 | 2 | 292.4 | 202.1 | 1.200 | 10.75 |
| 183 | 3 | 2.5 | 10.0 | 12.25 | 2 | 281.1 | 202.1 | 1.179 | 12.15 |
| 183 | 3 | 2.5 | 10.0 | 12.25 | 2 | 286.8 | 202.1 | 1.216 | 11.35 |
| 183 | 3 | 2.5 | 10.0 | 12.25 | 2 | 293.1 | 202.6 | 1.200 | 10.74 |
| 183 | 3 | 2.5 | 10.0 | 12.25 | 2 | 281.8 | 202.6 | 1.178 | 12.12 |
| 183 | 3 | 2.5 | 10.0 | 12.25 | 2 | 287.4 | 202.6 | 1.215 | 11.33 |
| 183 | 3 | 2.5 | 10.0 | 12.25 | 2 | 293.7 | 202.5 | 1.199 | 10.66 |
| 183 | 3 | 2.5 | 10.0 | 12.25 | 2 | 282.3 | 202.5 | 1.178 | 12.04 |
| 183 | 3 | 2.5 | 10.0 | 12.25 | 2 | 288.0 | 202.5 | 1.215 | 11.25 |
| 183 | 3 | 3.5 | 14.0 | 9.48 | 2 | 310.3 | 203.1 | 1.665 | 7.02 |
| 183 | 3 | 3.5 | 14.0 | 9.48 | 2 | 296.4 | 203.1 | 1.637 | 7.97 |
| 183 | 3 | 3.5 | 14.0 | 9.48 | 2 | 303.4 | 203.1 | 1.687 | 7.43 |
| 183 | 3 | 3.5 | 14.0 | 9.48 | 2 | 310.7 | 203.4 | 1.664 | 7.01 |
| 183 | 3 | 3.5 | 14.0 | 9.48 | 2 | 296.7 | 203.4 | 1.636 | 7.97 |
| 183 | 3 | 3.5 | 14.0 | 9.48 | 2 | 303.7 | 203.4 | 1.686 | 7.42 |
| 183 | 3 | 3.5 | 14.0 | 9.48 | 2 | 317.8 | 203.8 | 1.658 | 6.60 |
| 183 | 3 | 3.5 | 14.0 | 9.48 | 2 | 297.5 | 203.8 | 1.635 | 7.95 |
| 183 | 3 | 3.5 | 14.0 | 9.48 | 2 | 307.7 | 203.8 | 1.683 | 7.17 |
| 183 | 3 | 4.5 | 18.0 | 8.92 | 2 | 323.7 | 202.9 | 2.126 | 5.87 |
| 183 | 3 | 4.5 | 18.0 | 8.92 | 2 | 306.3 | 202.9 | 2.094 | 6.78 |
| 183 | 3 | 4.5 | 18.0 | 8.92 | 2 | 315.0 | 202.9 | 2.157 | 6.27 |
| 183 | 3 | 4.5 | 18.0 | 8.92 | 2 | 323.8 | 202.8 | 2.126 | 5.87 |
| 183 | 3 | 4.5 | 18.0 | 8.92 | 2 | 307.5 | 202.8 | 2.093 | 6.70 |
| 183 | 3 | 4.5 | 18.0 | 8.92 | 2 | 315.6 | 202.8 | 2.156 | 6.22 |
| 183 | 3 | 4.5 | 18.0 | 8.92 | 2 | 323.9 | 202.5 | 2.126 | 5.85 |
| 183 | 3 | 4.5 | 18.0 | 8.92 | 2 | 306.4 | 202.5 | 2.094 | 6.75 |
| 183 | 3 | 4.5 | 18.0 | 8.92 | 2 | 315.2 | 202.5 | 2.157 | 6.24 |
| 183 | 3 | 5.5 | 22.0 | 7.68 | 2 | 339.1 | 202.4 | 2.580 | 4.47 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 183 | 3 | 5.5 | 22.0 | 7.68 | 2 | 319.0 | 202.4 | 2.544 | 5.19 |
| 183 | 3 | 5.5 | 22.0 | 7.68 | 2 | 329.0 | 202.4 | 2.618 | 4.78 |
| 183 | 3 | 5.5 | 22.0 | 7.68 | 2 | 338.5 | 202.4 | 2.581 | 4.49 |
| 183 | 3 | 5.5 | 22.0 | 7.68 | 2 | 318.5 | 202.4 | 2.545 | 5.20 |
| 183 | 3 | 5.5 | 22.0 | 7.68 | 2 | 328.5 | 202.4 | 2.619 | 4.80 |
| 183 | 3 | 5.5 | 22.0 | 7.68 | 2 | 339.1 | 202.7 | 2.579 | 4.48 |
| 183 | 3 | 5.5 | 22.0 | 7.68 | 2 | 319.2 | 202.7 | 2.543 | 5.19 |
| 183 | 3 | 5.5 | 22.0 | 7.68 | 2 | 329.2 | 202.7 | 2.618 | 4.79 |
| 184 | 3 | 1.0 | 4.0 | 19.24 | 2 | 255.2 | 199.9 | .490 | 27.51 |
| 184 | 3 | 1.0 | 4.0 | 19.24 | 2 | 248.0 | 199.9 | .480 | 31.26 |
| 184 | 3 | 1.0 | 4.0 | 19.24 | 2 | 251.6 | 199.9 | .496 | 29.13 |
| 184 | 3 | 1.0 | 4.0 | 19.24 | 2 | 256.1 | 199.5 | .490 | 26.88 |
| 184 | 3 | 1.0 | 4.0 | 19.24 | 2 | 248.0 | 199.5 | .480 | 31.04 |
| 184 | 3 | 1.0 | 4.0 | 19.24 | 2 | 252.1 | 199.5 | .496 | 28.67 |
| 184 | 3 | 1.0 | 4.0 | 19.24 | 2 | 256.9 | 199.5 | .489 | 26.53 |
| 184 | 3 | 1.0 | 4.0 | 19.24 | 2 | 248.0 | 199.5 | .480 | 30.98 |
| 184 | 3 | 1.0 | 4.0 | 19.24 | 2 | 252.4 | 199.5 | .495 | 28.44 |
| 184 | 3 | 1.5 | 6.0 | 15.55 | 2 | 273.0 | 201.1 | .728 | 17.13 |
| 184 | 3 | 1.5 | 6.0 | 15.55 | 2 | 263.3 | 201.1 | .714 | 19.57 |
| 184 | 3 | 1.5 | 6.0 | 15.55 | 2 | 268.2 | 201.1 | .737 | 18.18 |
| 184 | 3 | 1.5 | 6.0 | 15.55 | 2 | 273.5 | 201.1 | .727 | 17.00 |
| 184 | 3 | 1.5 | 6.0 | 15.55 | 2 | 263.7 | 201.1 | .714 | 19.42 |
| 184 | 3 | 1.5 | 6.0 | 15.55 | 2 | 268.6 | 201.1 | .737 | 18.04 |
| 184 | 3 | 1.5 | 6.0 | 15.55 | 2 | 271.0 | 200.4 | .729 | 17.43 |
| 184 | 3 | 1.5 | 6.0 | 15.55 | 2 | 260.7 | 200.4 | .715 | 20.18 |
| 184 | 3 | 1.5 | 6.0 | 15.55 | 2 | 265.9 | 200.4 | .738 | 18.61 |
| 184 | 3 | 2.0 | 8.0 | 13.39 | 2 | 283.6 | 201.4 | .965 | 12.90 |
| 184 | 3 | 2.0 | 8.0 | 13.39 | 2 | 273.3 | 201.4 | .947 | 14.58 |
| 184 | 3 | 2.0 | 8.0 | 13.39 | 2 | 278.5 | 201.4 | .977 | 13.62 |
| 184 | 3 | 2.0 | 8.0 | 13.39 | 2 | 283.9 | 201.2 | .965 | 12.83 |
| 184 | 3 | 2.0 | 8.0 | 13.39 | 2 | 273.6 | 201.2 | .947 | 14.48 |
| 184 | 3 | 2.0 | 8.0 | 13.39 | 2 | 278.8 | 201.2 | .977 | 13.54 |
| 184 | 3 | 2.0 | 8.0 | 13.39 | 2 | 284.1 | 201.6 | .965 | 12.87 |
| 184 | 3 | 2.0 | 8.0 | 13.39 | 2 | 273.6 | 201.6 | .947 | 14.57 |
| 184 | 3 | 2.0 | 8.0 | 13.39 | 2 | 278.8 | 201.6 | .977 | 13.60 |
| 184 | 3 | 2.5 | 10.0 | 12.34 | 2 | 292.4 | 202.1 | 1.200 | 10.83 |
| 184 | 3 | 2.5 | 10.0 | 12.34 | 2 | 281.1 | 202.1 | 1.179 | 12.24 |
| 184 | 3 | 2.5 | 10.0 | 12.34 | 2 | 286.8 | 202.1 | 1.216 | 11.44 |
| 184 | 3 | 2.5 | 10.0 | 12.34 | 2 | 293.1 | 202.6 | 1.200 | 10.81 |
| 184 | 3 | 2.5 | 10.0 | 12.34 | 2 | 281.8 | 202.6 | 1.178 | 12.21 |
| 184 | 3 | 2.5 | 10.0 | 12.34 | 2 | 287.4 | 202.6 | 1.215 | 11.42 |
| 184 | 3 | 2.5 | 10.0 | 12.34 | 2 | 293.7 | 202.5 | 1.199 | 10.74 |
| 184 | 3 | 2.5 | 10.0 | 12.34 | 2 | 282.3 | 202.5 | 1.178 | 12.13 |
| 184 | 3 | 2.5 | 10.0 | 12.34 | 2 | 288.0 | 202.5 | 1.215 | 11.34 |
| 184 | 3 | 4.5 | 18.0 | 8.84 | 2 | 323.7 | 202.9 | 2.126 | 5.82 |
| 184 | 3 | 4.5 | 18.0 | 8.84 | 2 | 306.3 | 202.9 | 2.094 | 6.72 |
| 184 | 3 | 4.5 | 18.0 | 8.84 | 2 | 315.0 | 202.9 | 2.157 | 6.21 |
| 184 | 3 | 4.5 | 18.0 | 8.84 | 2 | 323.8 | 202.8 | 2.126 | 5.81 |
| 184 | 3 | 4.5 | 18.0 | 8.84 | 2 | 307.5 | 202.8 | 2.093 | 6.63 |

| RUN | NO OF PEL | ETHYLENE CC/SC | HYDROGEN CC/SC | CONVERSION | THERMOCOUPLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 184 | 3 | 4.5 | 18.0 | 8.84 | 2 | 315.6 | 202.8 | 2.156 | 6.16 |
| 184 | 3 | 4.5 | 18.0 | 8.84 | 2 | 323.9 | 202.5 | 2.126 | 5.79 |
| 184 | 3 | 4.5 | 18.0 | 8.84 | 2 | 306.4 | 202.5 | 2.094 | 6.69 |
| 184 | 3 | 4.5 | 18.0 | 8.84 | 2 | 315.2 | 202.5 | 2.157 | 6.18 |
| 184 | 3 | 5.5 | 22.0 | 7.98 | 2 | 339.1 | 202.4 | 2.580 | 4.65 |
| 184 | 3 | 5.5 | 22.0 | 7.98 | 2 | 319.0 | 202.4 | 2.544 | 5.40 |
| 184 | 3 | 5.5 | 22.0 | 7.98 | 2 | 329.0 | 202.4 | 2.618 | 4.97 |
| 184 | 3 | 5.5 | 22.0 | 7.98 | 2 | 338.5 | 202.4 | 2.581 | 4.67 |
| 184 | 3 | 5.5 | 22.0 | 7.98 | 2 | 318.5 | 202.4 | 2.545 | 5.41 |
| 184 | 3 | 5.5 | 22.0 | 7.98 | 2 | 328.5 | 202.4 | 2.619 | 4.99 |
| 184 | 3 | 5.5 | 22.0 | 7.98 | 2 | 339.1 | 202.7 | 2.579 | 4.66 |
| 184 | 3 | 5.5 | 22.0 | 7.98 | 2 | 319.2 | 202.7 | 2.543 | 5.40 |
| 184 | 3 | 5.5 | 22.0 | 7.98 | 2 | 329.2 | 202.7 | 2.618 | 4.98 |
| 185 | 3 | 1.0 | 4.0 | 19.06 | 2 | 255.2 | 199.9 | .490 | 27.25 |
| 185 | 3 | 1.0 | 4.0 | 19.06 | 2 | 248.0 | 199.9 | .480 | 30.96 |
| 185 | 3 | 1.0 | 4.0 | 19.06 | 2 | 251.6 | 199.9 | .496 | 28.85 |
| 185 | 3 | 1.0 | 4.0 | 19.06 | 2 | 256.1 | 199.5 | .490 | 26.62 |
| 185 | 3 | 1.0 | 4.0 | 19.06 | 2 | 248.0 | 199.5 | .480 | 30.75 |
| 185 | 3 | 1.0 | 4.0 | 19.06 | 2 | 252.1 | 199.5 | .496 | 28.40 |
| 185 | 3 | 1.0 | 4.0 | 19.06 | 2 | 256.9 | 199.5 | .489 | 26.28 |
| 185 | 3 | 1.0 | 4.0 | 19.06 | 2 | 248.0 | 199.5 | .480 | 30.69 |
| 185 | 3 | 1.0 | 4.0 | 19.06 | 2 | 252.4 | 199.5 | .495 | 28.17 |
| 185 | 3 | 1.5 | 6.0 | 14.86 | 2 | 273.0 | 201.1 | .728 | 16.38 |
| 185 | 3 | 1.5 | 6.0 | 14.86 | 2 | 263.3 | 201.1 | .714 | 18.71 |
| 185 | 3 | 1.5 | 6.0 | 14.86 | 2 | 268.2 | 201.1 | .737 | 17.38 |
| 185 | 3 | 1.5 | 6.0 | 14.86 | 2 | 273.5 | 201.1 | .727 | 16.26 |
| 185 | 3 | 1.5 | 6.0 | 14.86 | 2 | 263.7 | 201.1 | .714 | 18.57 |
| 185 | 3 | 1.5 | 6.0 | 14.86 | 2 | 268.6 | 201.1 | .737 | 17.25 |
| 185 | 3 | 1.5 | 6.0 | 14.86 | 2 | 271.0 | 200.4 | .729 | 16.66 |
| 185 | 3 | 1.5 | 6.0 | 14.86 | 2 | 260.7 | 200.4 | .715 | 19.30 |
| 185 | 3 | 1.5 | 6.0 | 14.86 | 2 | 265.9 | 200.4 | .738 | 17.80 |
| 185 | 3 | 2.0 | 8.0 | 13.38 | 2 | 283.6 | 201.4 | .965 | 12.90 |
| 185 | 3 | 2.0 | 8.0 | 13.38 | 2 | 273.3 | 201.4 | .947 | 14.58 |
| 185 | 3 | 2.0 | 8.0 | 13.38 | 2 | 278.5 | 201.4 | .977 | 13.62 |
| 185 | 3 | 2.0 | 8.0 | 13.38 | 2 | 283.9 | 201.2 | .965 | 12.83 |
| 185 | 3 | 2.0 | 8.0 | 13.38 | 2 | 273.6 | 201.2 | .947 | 14.48 |
| 185 | 3 | 2.0 | 8.0 | 13.38 | 2 | 278.8 | 201.2 | .977 | 13.54 |
| 185 | 3 | 2.0 | 8.0 | 13.38 | 2 | 284.1 | 201.6 | .965 | 12.87 |
| 185 | 3 | 2.0 | 8.0 | 13.38 | 2 | 273.6 | 201.6 | .947 | 14.57 |
| 185 | 3 | 2.0 | 8.0 | 13.38 | 2 | 278.8 | 201.6 | .977 | 13.60 |
| 185 | 3 | 2.5 | 10.0 | 12.34 | 2 | 292.4 | 202.1 | 1.200 | 10.83 |
| 185 | 3 | 2.5 | 10.0 | 12.34 | 2 | 281.1 | 202.1 | 1.179 | 12.24 |
| 185 | 3 | 2.5 | 10.0 | 12.34 | 2 | 286.8 | 202.1 | 1.216 | 11.44 |
| 185 | 3 | 2.5 | 10.0 | 12.34 | 2 | 293.1 | 202.6 | 1.200 | 10.81 |
| 185 | 3 | 2.5 | 10.0 | 12.34 | 2 | 281.8 | 202.6 | 1.178 | 12.21 |
| 185 | 3 | 2.5 | 10.0 | 12.34 | 2 | 287.4 | 202.6 | 1.215 | 11.42 |
| 185 | 3 | 2.5 | 10.0 | 12.34 | 2 | 293.7 | 202.5 | 1.199 | 10.74 |
| 185 | 3 | 2.5 | 10.0 | 12.34 | 2 | 282.3 | 202.5 | 1.178 | 12.13 |
| 185 | 3 | 2.5 | 10.0 | 12.34 | 2 | 288.0 | 202.5 | 1.215 | 11.34 |

| RUN | NO OF PEL | ETHYLENE CC/SC | HYDROGEN CC/SC | CONVERSION | THERMOCOUPLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 185 | 3 | 3.5 | 14.0 | 10.29 | 2 | 310.3 | 203.1 | 1.665 | 7.62 |
| 185 | 3 | 3.5 | 14.0 | 10.29 | 2 | 296.4 | 203.1 | 1.637 | 8.66 |
| 185 | 3 | 3.5 | 14.0 | 10.29 | 2 | 303.4 | 203.1 | 1.687 | 8.07 |
| 185 | 3 | 3.5 | 14.0 | 10.29 | 2 | 310.7 | 203.4 | 1.664 | 7.61 |
| 185 | 3 | 3.5 | 14.0 | 10.29 | 2 | 296.7 | 203.4 | 1.636 | 8.66 |
| 185 | 3 | 3.5 | 14.0 | 10.29 | 2 | 303.7 | 203.4 | 1.686 | 8.06 |
| 185 | 3 | 3.5 | 14.0 | 10.29 | 2 | 317.8 | 203.8 | 1.658 | 7.17 |
| 185 | 3 | 3.5 | 14.0 | 10.29 | 2 | 297.5 | 203.8 | 1.635 | 8.63 |
| 185 | 3 | 3.5 | 14.0 | 10.29 | 2 | 307.7 | 203.8 | 1.683 | 7.79 |
| 185 | 3 | 4.5 | 18.0 | 8.89 | 2 | 323.7 | 202.9 | 2.126 | 5.85 |
| 185 | 3 | 4.5 | 18.0 | 8.89 | 2 | 306.3 | 202.9 | 2.094 | 6.76 |
| 185 | 3 | 4.5 | 18.0 | 8.89 | 2 | 315.0 | 202.9 | 2.157 | 6.24 |
| 185 | 3 | 4.5 | 18.0 | 8.89 | 2 | 323.8 | 202.8 | 2.126 | 5.84 |
| 185 | 3 | 4.5 | 18.0 | 8.89 | 2 | 307.5 | 202.8 | 2.093 | 6.67 |
| 185 | 3 | 4.5 | 18.0 | 8.89 | 2 | 315.6 | 202.8 | 2.156 | 6.20 |
| 185 | 3 | 4.5 | 18.0 | 8.89 | 2 | 323.9 | 202.5 | 2.126 | 5.82 |
| 185 | 3 | 4.5 | 18.0 | 8.89 | 2 | 306.4 | 202.5 | 2.094 | 6.73 |
| 185 | 3 | 4.5 | 18.0 | 8.89 | 2 | 315.2 | 202.5 | 2.157 | 6.21 |
| 185 | 3 | 5.5 | 22.0 | 7.87 | 2 | 339.1 | 202.4 | 2.580 | 4.59 |
| 185 | 3 | 5.5 | 22.0 | 7.87 | 2 | 319.0 | 202.4 | 2.544 | 5.32 |
| 185 | 3 | 5.5 | 22.0 | 7.87 | 2 | 329.0 | 202.4 | 2.618 | 4.90 |
| 185 | 3 | 5.5 | 22.0 | 7.87 | 2 | 338.5 | 202.4 | 2.581 | 4.61 |
| 185 | 3 | 5.5 | 22.0 | 7.87 | 2 | 318.5 | 202.4 | 2.545 | 5.33 |
| 185 | 3 | 5.5 | 22.0 | 7.87 | 2 | 328.5 | 202.4 | 2.619 | 4.92 |
| 185 | 3 | 5.5 | 22.0 | 7.87 | 2 | 339.1 | 202.7 | 2.579 | 4.60 |
| 185 | 3 | 5.5 | 22.0 | 7.87 | 2 | 319.2 | 202.7 | 2.543 | 5.32 |
| 185 | 3 | 5.5 | 22.0 | 7.87 | 2 | 329.2 | 202.7 | 2.618 | 4.91 |
| 191 | 3 | 1.0 | 4.0 | 17.28 | 2 | 204.9 | 147.3 | .518 | 23.97 |
| 191 | 3 | 1.0 | 4.0 | 17.28 | 2 | 195.4 | 147.3 | .509 | 28.35 |
| 191 | 3 | 1.0 | 4.0 | 17.28 | 2 | 200.2 | 147.3 | .525 | 25.85 |
| 191 | 3 | 1.0 | 4.0 | 17.26 | 2 | 203.6 | 147.2 | .519 | 24.47 |
| 191 | 3 | 1.0 | 4.0 | 17.26 | 2 | 194.3 | 147.2 | .509 | 28.95 |
| 191 | 3 | 1.0 | 4.0 | 17.26 | 2 | 199.0 | 147.2 | .525 | 26.39 |
| 191 | 3 | 1.0 | 4.0 | 17.26 | 2 | 203.8 | 147.5 | .519 | 24.50 |
| 191 | 3 | 1.0 | 4.0 | 17.26 | 2 | 194.5 | 147.5 | .509 | 29.05 |
| 191 | 3 | 1.0 | 4.0 | 17.26 | 2 | 199.1 | 147.5 | .525 | 26.45 |
| 191 | 3 | 1.0 | 4.0 | 17.26 | 2 | 204.4 | 147.8 | .518 | 24.40 |
| 191 | 3 | 1.0 | 4.0 | 17.26 | 2 | 195.2 | 147.8 | .509 | 28.81 |
| 191 | 3 | 1.0 | 4.0 | 17.26 | 2 | 199.8 | 147.8 | .525 | 26.29 |
| 191 | 3 | 1.5 | 6.0 | 13.87 | 2 | 217.3 | 147.3 | .772 | 15.87 |
| 191 | 3 | 1.5 | 6.0 | 13.87 | 2 | 207.6 | 147.3 | .758 | 18.23 |
| 191 | 3 | 1.5 | 6.0 | 13.87 | 2 | 212.4 | 147.3 | .782 | 16.88 |
| 191 | 3 | 1.5 | 6.0 | 13.87 | 2 | 217.3 | 147.4 | .772 | 15.87 |
| 191 | 3 | 1.5 | 6.0 | 13.87 | 2 | 207.6 | 147.4 | .758 | 18.24 |
| 191 | 3 | 1.5 | 6.0 | 13.87 | 2 | 212.4 | 147.4 | .782 | 16.89 |
| 191 | 3 | 1.5 | 6.0 | 13.87 | 2 | 217.5 | 147.6 | .772 | 15.88 |
| 191 | 3 | 1.5 | 6.0 | 13.87 | 2 | 207.7 | 147.6 | .758 | 18.26 |
| 191 | 3 | 1.5 | 6.0 | 13.87 | 2 | 212.6 | 147.6 | .782 | 16.90 |
| 191 | 3 | 1.5 | 6.0 | 13.87 | 2 | 217.7 | 147.7 | .772 | 15.85 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 191 | 3 | 1.5 | 6.0 | 13.87 | 2 | 208.0 | 147.7 | .758 | 18.19 |
| 191 | 3 | 1.5 | 6.0 | 13.87 | 2 | 212.9 | 147.7 | .782 | 16.86 |
| 191 | 3 | 2.0 | 8.0 | 12.20 | 2 | 227.4 | 146.9 | 1.024 | 12.15 |
| 191 | 3 | 2.0 | 8.0 | 12.20 | 2 | 217.3 | 146.9 | 1.006 | 13.74 |
| 191 | 3 | 2.0 | 8.0 | 12.20 | 2 | 222.4 | 146.9 | 1.037 | 12.84 |
| 191 | 3 | 2.0 | 8.0 | 12.20 | 2 | 226.8 | 146.2 | 1.025 | 12.14 |
| 191 | 3 | 2.0 | 8.0 | 12.20 | 2 | 216.3 | 146.2 | 1.007 | 13.80 |
| 191 | 3 | 2.0 | 8.0 | 12.20 | 2 | 221.6 | 146.2 | 1.038 | 12.85 |
| 191 | 3 | 2.0 | 8.0 | 12.20 | 2 | 226.3 | 145.5 | 1.026 | 12.11 |
| 191 | 3 | 2.0 | 8.0 | 12.20 | 2 | 215.7 | 145.5 | 1.007 | 13.78 |
| 191 | 3 | 2.0 | 8.0 | 12.20 | 2 | 221.0 | 145.5 | 1.039 | 12.83 |
| 191 | 3 | 2.0 | 8.0 | 12.20 | 2 | 225.7 | 145.4 | 1.026 | 12.19 |
| 191 | 3 | 2.0 | 8.0 | 12.20 | 2 | 215.1 | 145.4 | 1.008 | 13.88 |
| 191 | 3 | 2.0 | 8.0 | 12.20 | 2 | 220.4 | 145.4 | 1.039 | 12.92 |
| 191 | 3 | 2.5 | 10.0 | 11.17 | 2 | 236.3 | 146.2 | 1.275 | 9.96 |
| 191 | 3 | 2.5 | 10.0 | 11.17 | 2 | 224.6 | 146.2 | 1.253 | 11.30 |
| 191 | 3 | 2.5 | 10.0 | 11.17 | 2 | 230.4 | 146.2 | 1.291 | 10.54 |
| 191 | 3 | 2.5 | 10.0 | 11.17 | 2 | 236.4 | 146.1 | 1.275 | 9.93 |
| 191 | 3 | 2.5 | 10.0 | 11.17 | 2 | 224.6 | 146.1 | 1.253 | 11.30 |
| 191 | 3 | 2.5 | 10.0 | 11.17 | 2 | 230.5 | 146.1 | 1.291 | 10.52 |
| 191 | 3 | 2.5 | 10.0 | 11.17 | 2 | 236.4 | 146.2 | 1.275 | 9.94 |
| 191 | 3 | 2.5 | 10.0 | 11.17 | 2 | 224.5 | 146.2 | 1.253 | 11.31 |
| 191 | 3 | 2.5 | 10.0 | 11.17 | 2 | 230.5 | 146.2 | 1.291 | 10.53 |
| 191 | 3 | 2.5 | 10.0 | 11.17 | 2 | 236.3 | 146.0 | 1.275 | 9.93 |
| 191 | 3 | 2.5 | 10.0 | 11.17 | 2 | 224.6 | 146.0 | 1.253 | 11.27 |
| 191 | 3 | 2.5 | 10.0 | 11.17 | 2 | 230.4 | 146.0 | 1.292 | 10.51 |
| 191 | 3 | 3.5 | 14.0 | 9.50 | 2 | 254.0 | 146.5 | 1.767 | 7.10 |
| 191 | 3 | 3.5 | 14.0 | 9.50 | 2 | 239.1 | 146.5 | 1.739 | 8.15 |
| 191 | 3 | 3.5 | 14.0 | 9.50 | 2 | 246.6 | 146.5 | 1.792 | 7.55 |
| 191 | 3 | 3.5 | 14.0 | 9.50 | 2 | 254.9 | 146.5 | 1.766 | 7.05 |
| 191 | 3 | 3.5 | 14.0 | 9.50 | 2 | 239.7 | 146.5 | 1.739 | 8.10 |
| 191 | 3 | 3.5 | 14.0 | 9.50 | 2 | 247.3 | 146.5 | 1.791 | 7.50 |
| 191 | 3 | 3.5 | 14.0 | 9.50 | 2 | 254.5 | 146.4 | 1.766 | 7.06 |
| 191 | 3 | 3.5 | 14.0 | 9.50 | 2 | 239.4 | 146.4 | 1.739 | 8.12 |
| 191 | 3 | 3.5 | 14.0 | 9.50 | 2 | 246.9 | 146.4 | 1.791 | 7.52 |
| 191 | 3 | 3.5 | 14.0 | 9.50 | 2 | 253.5 | 146.2 | 1.768 | 7.12 |
| 191 | 3 | 3.5 | 14.0 | 9.50 | 2 | 238.5 | 146.2 | 1.740 | 8.18 |
| 191 | 3 | 3.5 | 14.0 | 9.50 | 2 | 246.0 | 146.2 | 1.792 | 7.57 |
| 191 | 3 | 4.5 | 18.0 | 8.64 | 2 | 268.1 | 146.7 | 2.254 | 5.73 |
| 191 | 3 | 4.5 | 18.0 | 8.64 | 2 | 250.6 | 146.7 | 2.222 | 6.61 |
| 191 | 3 | 4.5 | 18.0 | 8.64 | 2 | 259.4 | 146.7 | 2.287 | 6.11 |
| 191 | 3 | 4.5 | 18.0 | 8.64 | 2 | 267.7 | 146.6 | 2.255 | 5.74 |
| 191 | 3 | 4.5 | 18.0 | 8.64 | 2 | 250.2 | 146.6 | 2.222 | 6.64 |
| 191 | 3 | 4.5 | 18.0 | 8.64 | 2 | 258.9 | 146.6 | 2.288 | 6.13 |
| 191 | 3 | 4.5 | 18.0 | 8.64 | 2 | 267.9 | 146.4 | 2.255 | 5.72 |
| 191 | 3 | 4.5 | 18.0 | 8.64 | 2 | 250.4 | 146.4 | 2.222 | 6.61 |
| 191 | 3 | 4.5 | 18.0 | 8.64 | 2 | 259.2 | 146.4 | 2.288 | 6.11 |
| 191 | 3 | 4.5 | 18.0 | 8.64 | 2 | 267.9 | 146.3 | 2.255 | 5.72 |
| 191 | 3 | 4.5 | 18.0 | 8.64 | 2 | 250.6 | 146.3 | 2.222 | 6.59 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 191 | 3 | 4.5 | 18.0 | 8.64 | 2 | 259.3 | 146.3 | 2.288 | 6.09 |
| 191 | 3 | 5.5 | 22.0 | 7.79 | 2 | 282.8 | 146.6 | 2.733 | 4.61 |
| 191 | 3 | 5.5 | 22.0 | 7.79 | 2 | 262.9 | 146.6 | 2.698 | 5.33 |
| 191 | 3 | 5.5 | 22.0 | 7.79 | 2 | 272.8 | 146.6 | 2.775 | 4.92 |
| 191 | 3 | 5.5 | 22.0 | 7.79 | 2 | 283.0 | 146.5 | 2.733 | 4.60 |
| 191 | 3 | 5.5 | 22.0 | 7.79 | 2 | 262.7 | 146.5 | 2.698 | 5.34 |
| 191 | 3 | 5.5 | 22.0 | 7.79 | 2 | 272.9 | 146.5 | 2.775 | 4.92 |
| 191 | 3 | 5.5 | 22.0 | 7.79 | 2 | 283.7 | 146.6 | 2.732 | 4.58 |
| 191 | 3 | 5.5 | 22.0 | 7.79 | 2 | 263.3 | 146.6 | 2.697 | 5.32 |
| 191 | 3 | 5.5 | 22.0 | 7.79 | 2 | 273.5 | 146.6 | 2.774 | 4.90 |
| 191 | 3 | 5.5 | 22.0 | 7.79 | 2 | 282.9 | 146.6 | 2.733 | 4.61 |
| 191 | 3 | 5.5 | 22.0 | 7.79 | 2 | 263.1 | 146.6 | 2.697 | 5.33 |
| 191 | 3 | 5.5 | 22.0 | 7.79 | 2 | 273.0 | 146.6 | 2.775 | 4.92 |
| 192 | 3 | 1.0 | 4.0 | 17.20 | 2 | 204.9 | 147.3 | .518 | 23.85 |
| 192 | 3 | 1.0 | 4.0 | 17.20 | 2 | 195.4 | 147.3 | .509 | 28.22 |
| 192 | 3 | 1.0 | 4.0 | 17.20 | 2 | 200.2 | 147.3 | .525 | 25.72 |
| 192 | 3 | 1.0 | 4.0 | 17.20 | 2 | 203.6 | 147.2 | .519 | 24.38 |
| 192 | 3 | 1.0 | 4.0 | 17.20 | 2 | 194.3 | 147.2 | .509 | 28.84 |
| 192 | 3 | 1.0 | 4.0 | 17.20 | 2 | 199.0 | 147.2 | .525 | 26.29 |
| 192 | 3 | 1.0 | 4.0 | 17.20 | 2 | 203.8 | 147.5 | .519 | 24.41 |
| 192 | 3 | 1.0 | 4.0 | 17.20 | 2 | 194.5 | 147.5 | .509 | 28.95 |
| 192 | 3 | 1.0 | 4.0 | 17.20 | 2 | 199.1 | 147.5 | .525 | 26.35 |
| 192 | 3 | 1.0 | 4.0 | 17.20 | 2 | 204.4 | 147.8 | .518 | 24.31 |
| 192 | 3 | 1.0 | 4.0 | 17.20 | 2 | 195.2 | 147.8 | .509 | 28.71 |
| 192 | 3 | 1.0 | 4.0 | 17.20 | 2 | 199.8 | 147.8 | .525 | 26.20 |
| 192 | 3 | 1.5 | 6.0 | 14.30 | 2 | 217.3 | 147.3 | .772 | 16.37 |
| 192 | 3 | 1.5 | 6.0 | 14.30 | 2 | 207.6 | 147.3 | .758 | 18.80 |
| 192 | 3 | 1.5 | 6.0 | 14.30 | 2 | 212.4 | 147.3 | .782 | 17.41 |
| 192 | 3 | 1.5 | 6.0 | 14.30 | 2 | 217.3 | 147.4 | .772 | 16.37 |
| 192 | 3 | 1.5 | 6.0 | 14.30 | 2 | 207.6 | 147.4 | .758 | 18.81 |
| 192 | 3 | 1.5 | 6.0 | 14.30 | 2 | 212.4 | 147.4 | .782 | 17.42 |
| 192 | 3 | 1.5 | 6.0 | 14.30 | 2 | 217.5 | 147.6 | .772 | 16.38 |
| 192 | 3 | 1.5 | 6.0 | 14.30 | 2 | 207.7 | 147.6 | .758 | 18.84 |
| 192 | 3 | 1.5 | 6.0 | 14.30 | 2 | 212.6 | 147.6 | .782 | 17.43 |
| 192 | 3 | 1.5 | 6.0 | 14.30 | 2 | 217.7 | 147.7 | .772 | 16.35 |
| 192 | 3 | 1.5 | 6.0 | 14.30 | 2 | 208.0 | 147.7 | .758 | 18.76 |
| 192 | 3 | 1.5 | 6.0 | 14.30 | 2 | 212.9 | 147.7 | .782 | 17.39 |
| 192 | 3 | 2.0 | 8.0 | 12.25 | 2 | 227.4 | 146.9 | 1.024 | 12.20 |
| 192 | 3 | 2.0 | 8.0 | 12.25 | 2 | 217.3 | 146.9 | 1.006 | 13.80 |
| 192 | 3 | 2.0 | 8.0 | 12.25 | 2 | 222.4 | 146.9 | 1.037 | 12.89 |
| 192 | 3 | 2.0 | 8.0 | 12.25 | 2 | 226.8 | 146.2 | 1.025 | 12.19 |
| 192 | 3 | 2.0 | 8.0 | 12.25 | 2 | 216.3 | 146.2 | 1.007 | 13.86 |
| 192 | 3 | 2.0 | 8.0 | 12.25 | 2 | 221.6 | 146.2 | 1.038 | 12.91 |
| 192 | 3 | 2.0 | 8.0 | 12.25 | 2 | 226.3 | 145.5 | 1.026 | 12.16 |
| 192 | 3 | 2.0 | 8.0 | 12.25 | 2 | 215.7 | 145.5 | 1.007 | 13.84 |
| 192 | 3 | 2.0 | 8.0 | 12.25 | 2 | 221.0 | 145.5 | 1.039 | 12.88 |
| 192 | 3 | 2.0 | 8.0 | 12.25 | 2 | 225.7 | 145.4 | 1.026 | 12.24 |
| 192 | 3 | 2.0 | 8.0 | 12.25 | 2 | 215.1 | 145.4 | 1.008 | 13.94 |
| 192 | 3 | 2.0 | 8.0 | 12.25 | 2 | 220.4 | 145.4 | 1.039 | 12.97 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 192 | 3 | 2.5 | 10.0 | 10.81 | 2 | 236.3 | 146.2 | 1.275 | 9.63 |
| 192 | 3 | 2.5 | 10.0 | 10.81 | 2 | 224.6 | 146.2 | 1.253 | 10.94 |
| 192 | 3 | 2.5 | 10.0 | 10.81 | 2 | 230.4 | 146.2 | 1.291 | 10.19 |
| 192 | 3 | 2.5 | 10.0 | 10.81 | 2 | 236.4 | 146.1 | 1.275 | 9.60 |
| 192 | 3 | 2.5 | 10.0 | 10.81 | 2 | 224.6 | 146.1 | 1.253 | 10.93 |
| 192 | 3 | 2.5 | 10.0 | 10.81 | 2 | 230.5 | 146.1 | 1.291 | 10.17 |
| 192 | 3 | 2.5 | 10.0 | 10.81 | 2 | 236.4 | 146.2 | 1.275 | 9.61 |
| 192 | 3 | 2.5 | 10.0 | 10.81 | 2 | 224.5 | 146.2 | 1.253 | 10.94 |
| 192 | 3 | 2.5 | 10.0 | 10.81 | 2 | 230.5 | 146.2 | 1.291 | 10.18 |
| 192 | 3 | 2.5 | 10.0 | 10.81 | 2 | 236.3 | 146.0 | 1.275 | 9.60 |
| 192 | 3 | 2.5 | 10.0 | 10.81 | 2 | 224.6 | 146.0 | 1.253 | 10.91 |
| 192 | 3 | 2.5 | 10.0 | 10.81 | 2 | 230.4 | 146.0 | 1.292 | 10.16 |
| 192 | 3 | 3.5 | 14.0 | 9.68 | 2 | 254.0 | 146.5 | 1.767 | 7.23 |
| 192 | 3 | 3.5 | 14.0 | 9.68 | 2 | 239.1 | 146.5 | 1.739 | 8.31 |
| 192 | 3 | 3.5 | 14.0 | 9.68 | 2 | 246.6 | 146.5 | 1.792 | 7.70 |
| 192 | 3 | 3.5 | 14.0 | 9.68 | 2 | 254.9 | 146.5 | 1.766 | 7.18 |
| 192 | 3 | 3.5 | 14.0 | 9.68 | 2 | 239.7 | 146.5 | 1.739 | 8.26 |
| 192 | 3 | 3.5 | 14.0 | 9.68 | 2 | 247.3 | 146.5 | 1.791 | 7.64 |
| 192 | 3 | 3.5 | 14.0 | 9.68 | 2 | 254.5 | 146.4 | 1.766 | 7.20 |
| 192 | 3 | 3.5 | 14.0 | 9.68 | 2 | 239.4 | 146.4 | 1.739 | 8.28 |
| 192 | 3 | 3.5 | 14.0 | 9.68 | 2 | 246.9 | 146.4 | 1.791 | 7.66 |
| 192 | 3 | 3.5 | 14.0 | 9.68 | 2 | 253.5 | 146.2 | 1.768 | 7.25 |
| 192 | 3 | 3.5 | 14.0 | 9.68 | 2 | 238.5 | 146.2 | 1.740 | 8.34 |
| 192 | 3 | 3.5 | 14.0 | 9.68 | 2 | 246.0 | 146.2 | 1.792 | 7.72 |
| 192 | 3 | 4.5 | 18.0 | 8.14 | 2 | 268.1 | 146.7 | 2.254 | 5.39 |
| 192 | 3 | 4.5 | 18.0 | 8.14 | 2 | 250.6 | 146.7 | 2.222 | 6.23 |
| 192 | 3 | 4.5 | 18.0 | 8.14 | 2 | 259.4 | 146.7 | 2.287 | 5.75 |
| 192 | 3 | 4.5 | 18.0 | 8.14 | 2 | 267.7 | 146.6 | 2.255 | 5.41 |
| 192 | 3 | 4.5 | 18.0 | 8.14 | 2 | 250.2 | 146.6 | 2.222 | 6.25 |
| 192 | 3 | 4.5 | 18.0 | 8.14 | 2 | 258.9 | 146.6 | 2.288 | 5.77 |
| 192 | 3 | 4.5 | 18.0 | 8.14 | 2 | 267.9 | 146.4 | 2.255 | 5.39 |
| 192 | 3 | 4.5 | 18.0 | 8.14 | 2 | 250.4 | 146.4 | 2.222 | 6.23 |
| 192 | 3 | 4.5 | 18.0 | 8.14 | 2 | 259.2 | 146.4 | 2.288 | 5.75 |
| 192 | 3 | 4.5 | 18.0 | 8.14 | 2 | 267.9 | 146.3 | 2.255 | 5.39 |
| 192 | 3 | 4.5 | 18.0 | 8.14 | 2 | 250.6 | 146.3 | 2.222 | 6.21 |
| 192 | 3 | 4.5 | 18.0 | 8.14 | 2 | 259.3 | 146.3 | 2.288 | 5.74 |
| 192 | 3 | 5.5 | 22.0 | 8.56 | 2 | 282.8 | 146.6 | 2.733 | 5.06 |
| 192 | 3 | 5.5 | 22.0 | 8.56 | 2 | 262.9 | 146.6 | 2.698 | 5.86 |
| 192 | 3 | 5.5 | 22.0 | 8.56 | 2 | 272.8 | 146.6 | 2.775 | 5.41 |
| 192 | 3 | 5.5 | 22.0 | 8.56 | 2 | 283.0 | 146.5 | 2.733 | 5.05 |
| 192 | 3 | 5.5 | 22.0 | 8.56 | 2 | 262.7 | 146.5 | 2.698 | 5.87 |
| 192 | 3 | 5.5 | 22.0 | 8.56 | 2 | 272.9 | 146.5 | 2.775 | 5.40 |
| 192 | 3 | 5.5 | 22.0 | 8.56 | 2 | 283.7 | 146.6 | 2.732 | 5.03 |
| 192 | 3 | 5.5 | 22.0 | 8.56 | 2 | 263.3 | 146.6 | 2.697 | 5.85 |
| 192 | 3 | 5.5 | 22.0 | 8.56 | 2 | 273.5 | 146.6 | 2.774 | 5.38 |
| 192 | 3 | 5.5 | 22.0 | 8.56 | 2 | 282.9 | 146.6 | 2.733 | 5.06 |
| 192 | 3 | 5.5 | 22.0 | 8.56 | 2 | 263.1 | 146.6 | 2.697 | 5.85 |
| 192 | 3 | 5.5 | 22.0 | 8.56 | 2 | 273.0 | 146.6 | 2.775 | 5.40 |
| 193 | 3 | 1.0 | 4.0 | 17.34 | 2 | 204.9 | 147.3 | .518 | 24.06 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 193 | 3 | 1.0 | 4.0 | 17.34 | 2 | 195.4 | 147.3 | .509 | 28.46 |
| 193 | 3 | 1.0 | 4.0 | 17.34 | 2 | 200.2 | 147.3 | .525 | 25.95 |
| 193 | 3 | 1.0 | 4.0 | 17.34 | 2 | 203.6 | 147.2 | .519 | 24.59 |
| 193 | 3 | 1.0 | 4.0 | 17.34 | 2 | 194.3 | 147.2 | .509 | 29.09 |
| 193 | 3 | 1.0 | 4.0 | 17.34 | 2 | 199.0 | 147.2 | .525 | 26.52 |
| 193 | 3 | 1.0 | 4.0 | 17.34 | 2 | 203.8 | 147.5 | .519 | 24.62 |
| 193 | 3 | 1.0 | 4.0 | 17.34 | 2 | 194.5 | 147.5 | .509 | 29.20 |
| 193 | 3 | 1.0 | 4.0 | 17.34 | 2 | 199.1 | 147.5 | .525 | 26.58 |
| 193 | 3 | 1.0 | 4.0 | 17.34 | 2 | 204.4 | 147.8 | .518 | 24.52 |
| 193 | 3 | 1.0 | 4.0 | 17.34 | 2 | 195.2 | 147.8 | .509 | 28.95 |
| 193 | 3 | 1.0 | 4.0 | 17.34 | 2 | 199.8 | 147.8 | .525 | 26.42 |
| 193 | 3 | 1.5 | 6.0 | 14.17 | 2 | 217.3 | 147.3 | .772 | 16.21 |
| 193 | 3 | 1.5 | 6.0 | 14.17 | 2 | 207.6 | 147.3 | .758 | 18.62 |
| 193 | 3 | 1.5 | 6.0 | 14.17 | 2 | 212.4 | 147.3 | .782 | 17.25 |
| 193 | 3 | 1.5 | 6.0 | 14.17 | 2 | 217.3 | 147.4 | .772 | 16.22 |
| 193 | 3 | 1.5 | 6.0 | 14.17 | 2 | 207.6 | 147.4 | .758 | 18.63 |
| 193 | 3 | 1.5 | 6.0 | 14.17 | 2 | 212.4 | 147.4 | .782 | 17.26 |
| 193 | 3 | 1.5 | 6.0 | 14.17 | 2 | 217.5 | 147.6 | .772 | 16.22 |
| 193 | 3 | 1.5 | 6.0 | 14.17 | 2 | 207.7 | 147.6 | .758 | 18.66 |
| 193 | 3 | 1.5 | 6.0 | 14.17 | 2 | 212.6 | 147.6 | .782 | 17.27 |
| 193 | 3 | 1.5 | 6.0 | 14.17 | 2 | 217.7 | 147.7 | .772 | 16.20 |
| 193 | 3 | 1.5 | 6.0 | 14.17 | 2 | 208.0 | 147.7 | .758 | 18.59 |
| 193 | 3 | 1.5 | 6.0 | 14.17 | 2 | 212.9 | 147.7 | .782 | 17.23 |
| 193 | 3 | 2.0 | 8.0 | 12.51 | 2 | 227.4 | 146.9 | 1.024 | 12.45 |
| 193 | 3 | 2.0 | 8.0 | 12.51 | 2 | 217.3 | 146.9 | 1.006 | 14.08 |
| 193 | 3 | 2.0 | 8.0 | 12.51 | 2 | 222.4 | 146.9 | 1.037 | 13.15 |
| 193 | 3 | 2.0 | 8.0 | 12.51 | 2 | 226.8 | 146.2 | 1.025 | 12.44 |
| 193 | 3 | 2.0 | 8.0 | 12.51 | 2 | 216.3 | 146.2 | 1.007 | 14.14 |
| 193 | 3 | 2.0 | 8.0 | 12.51 | 2 | 221.6 | 146.2 | 1.038 | 13.17 |
| 193 | 3 | 2.0 | 8.0 | 12.51 | 2 | 226.3 | 145.5 | 1.026 | 12.41 |
| 193 | 3 | 2.0 | 8.0 | 12.51 | 2 | 215.7 | 145.5 | 1.007 | 14.12 |
| 193 | 3 | 2.0 | 8.0 | 12.51 | 2 | 221.0 | 145.5 | 1.039 | 13.14 |
| 193 | 3 | 2.0 | 8.0 | 12.51 | 2 | 225.7 | 145.4 | 1.026 | 12.49 |
| 193 | 3 | 2.0 | 8.0 | 12.51 | 2 | 215.1 | 145.4 | 1.008 | 14.23 |
| 193 | 3 | 2.0 | 8.0 | 12.51 | 2 | 220.4 | 145.4 | 1.039 | 13.24 |
| 193 | 3 | 2.5 | 10.0 | 10.98 | 2 | 236.3 | 146.2 | 1.275 | 9.79 |
| 193 | 3 | 2.5 | 10.0 | 10.98 | 2 | 224.6 | 146.2 | 1.253 | 11.11 |
| 193 | 3 | 2.5 | 10.0 | 10.98 | 2 | 230.4 | 146.2 | 1.291 | 10.35 |
| 193 | 3 | 2.5 | 10.0 | 10.98 | 2 | 236.4 | 146.1 | 1.275 | 9.76 |
| 193 | 3 | 2.5 | 10.0 | 10.98 | 2 | 224.6 | 146.1 | 1.253 | 11.10 |
| 193 | 3 | 2.5 | 10.0 | 10.98 | 2 | 230.5 | 146.1 | 1.291 | 10.33 |
| 193 | 3 | 2.5 | 10.0 | 10.98 | 2 | 236.4 | 146.2 | 1.275 | 9.76 |
| 193 | 3 | 2.5 | 10.0 | 10.98 | 2 | 224.5 | 146.2 | 1.253 | 11.11 |
| 193 | 3 | 2.5 | 10.0 | 10.98 | 2 | 230.5 | 146.2 | 1.291 | 10.34 |
| 193 | 3 | 2.5 | 10.0 | 10.98 | 2 | 236.3 | 146.0 | 1.275 | 9.76 |
| 193 | 3 | 2.5 | 10.0 | 10.98 | 2 | 224.6 | 146.0 | 1.253 | 11.08 |
| 193 | 3 | 2.5 | 10.0 | 10.98 | 2 | 230.4 | 146.0 | 1.292 | 10.33 |
| 193 | 3 | 3.5 | 14.0 | 9.35 | 2 | 254.0 | 146.5 | 1.767 | 6.99 |
| 193 | 3 | 3.5 | 14.0 | 9.35 | 2 | 239.1 | 146.5 | 1.739 | 8.03 |

| RUN | NO OF PEL | ETHYLENE CC/SC | HYDROGEN CC/SC | CONVERSION | THERMOCOUPLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 193 | 3 | 3.5 | 14.0 | 9.35 | 2 | 246.6 | 146.5 | 1.792 | 7.44 |
| 193 | 3 | 3.5 | 14.0 | 9.35 | 2 | 254.9 | 146.5 | 1.766 | 6.94 |
| 193 | 3 | 3.5 | 14.0 | 9.35 | 2 | 239.7 | 146.5 | 1.739 | 7.98 |
| 193 | 3 | 3.5 | 14.0 | 9.35 | 2 | 247.3 | 146.5 | 1.791 | 7.39 |
| 193 | 3 | 3.5 | 14.0 | 9.35 | 2 | 254.5 | 146.4 | 1.766 | 6.96 |
| 193 | 3 | 3.5 | 14.0 | 9.35 | 2 | 239.4 | 146.4 | 1.739 | 8.00 |
| 193 | 3 | 3.5 | 14.0 | 9.35 | 2 | 246.9 | 146.4 | 1.791 | 7.40 |
| 193 | 3 | 3.5 | 14.0 | 9.35 | 2 | 253.5 | 146.2 | 1.768 | 7.01 |
| 193 | 3 | 3.5 | 14.0 | 9.35 | 2 | 238.5 | 146.2 | 1.740 | 8.05 |
| 193 | 3 | 3.5 | 14.0 | 9.35 | 2 | 246.0 | 146.2 | 1.792 | 7.46 |
| 193 | 3 | 4.5 | 18.0 | 8.39 | 2 | 268.1 | 146.7 | 2.254 | 5.56 |
| 193 | 3 | 4.5 | 18.0 | 8.39 | 2 | 250.6 | 146.7 | 2.222 | 6.42 |
| 193 | 3 | 4.5 | 18.0 | 8.39 | 2 | 259.4 | 146.7 | 2.287 | 5.93 |
| 193 | 3 | 4.5 | 18.0 | 8.39 | 2 | 267.7 | 146.6 | 2.255 | 5.58 |
| 193 | 3 | 4.5 | 18.0 | 8.39 | 2 | 250.2 | 146.6 | 2.222 | 6.44 |
| 193 | 3 | 4.5 | 18.0 | 8.39 | 2 | 258.9 | 146.6 | 2.288 | 5.95 |
| 193 | 3 | 4.5 | 18.0 | 8.39 | 2 | 267.9 | 146.4 | 2.255 | 5.56 |
| 193 | 3 | 4.5 | 18.0 | 8.39 | 2 | 250.4 | 146.4 | 2.222 | 6.42 |
| 193 | 3 | 4.5 | 18.0 | 8.39 | 2 | 259.2 | 146.4 | 2.288 | 5.93 |
| 193 | 3 | 4.5 | 18.0 | 8.39 | 2 | 267.9 | 146.3 | 2.255 | 5.55 |
| 193 | 3 | 4.5 | 18.0 | 8.39 | 2 | 250.6 | 146.3 | 2.222 | 6.40 |
| 193 | 3 | 4.5 | 18.0 | 8.39 | 2 | 259.3 | 146.3 | 2.288 | 5.92 |
| 193 | 3 | 5.5 | 22.0 | 7.73 | 2 | 282.8 | 146.6 | 2.733 | 4.58 |
| 193 | 3 | 5.5 | 22.0 | 7.73 | 2 | 262.9 | 146.6 | 2.698 | 5.30 |
| 193 | 3 | 5.5 | 22.0 | 7.73 | 2 | 272.8 | 146.6 | 2.775 | 4.89 |
| 193 | 3 | 5.5 | 22.0 | 7.73 | 2 | 283.0 | 146.5 | 2.733 | 4.57 |
| 193 | 3 | 5.5 | 22.0 | 7.73 | 2 | 262.7 | 146.5 | 2.698 | 5.30 |
| 193 | 3 | 5.5 | 22.0 | 7.73 | 2 | 272.9 | 146.5 | 2.775 | 4.88 |
| 193 | 3 | 5.5 | 22.0 | 7.73 | 2 | 283.7 | 146.6 | 2.732 | 4.55 |
| 193 | 3 | 5.5 | 22.0 | 7.73 | 2 | 263.3 | 146.6 | 2.697 | 5.28 |
| 193 | 3 | 5.5 | 22.0 | 7.73 | 2 | 273.5 | 146.6 | 2.774 | 4.86 |
| 193 | 3 | 5.5 | 22.0 | 7.73 | 2 | 282.9 | 146.6 | 2.733 | 4.58 |
| 193 | 3 | 5.5 | 22.0 | 7.73 | 2 | 263.1 | 146.6 | 2.697 | 5.29 |
| 193 | 3 | 5.5 | 22.0 | 7.73 | 2 | 273.0 | 146.6 | 2.775 | 4.88 |
| 194 | 3 | 1.5 | 6.0 | 13.78 | 2 | 217.3 | 147.3 | .772 | 15.77 |
| 194 | 3 | 1.5 | 6.0 | 13.78 | 2 | 207.6 | 147.3 | .758 | 18.11 |
| 194 | 3 | 1.5 | 6.0 | 13.78 | 2 | 212.4 | 147.3 | .782 | 16.78 |
| 194 | 3 | 1.5 | 6.0 | 13.78 | 2 | 217.3 | 147.4 | .772 | 15.77 |
| 194 | 3 | 1.5 | 6.0 | 13.78 | 2 | 207.6 | 147.4 | .758 | 18.12 |
| 194 | 3 | 1.5 | 6.0 | 13.78 | 2 | 212.4 | 147.4 | .782 | 16.78 |
| 194 | 3 | 1.5 | 6.0 | 13.78 | 2 | 217.5 | 147.6 | .772 | 15.78 |
| 194 | 3 | 1.5 | 6.0 | 13.78 | 2 | 207.7 | 147.6 | .758 | 18.14 |
| 194 | 3 | 1.5 | 6.0 | 13.78 | 2 | 212.6 | 147.6 | .782 | 16.80 |
| 194 | 3 | 1.5 | 6.0 | 13.78 | 2 | 217.7 | 147.7 | .772 | 15.75 |
| 194 | 3 | 1.5 | 6.0 | 13.78 | 2 | 208.0 | 147.7 | .758 | 18.08 |
| 194 | 3 | 1.5 | 6.0 | 13.78 | 2 | 212.9 | 147.7 | .782 | 16.75 |
| 194 | 3 | 2.0 | 8.0 | 10.97 | 2 | 227.4 | 146.9 | 1.024 | 10.92 |
| 194 | 3 | 2.0 | 8.0 | 10.97 | 2 | 217.3 | 146.9 | 1.006 | 12.35 |
| 194 | 3 | 2.0 | 8.0 | 10.97 | 2 | 222.4 | 146.9 | 1.037 | 11.54 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 194 | 3 | 2.0 | 8.0 | 10.97 | 2 | 226.8 | 146.2 | 1.025 | 10.91 |
| 194 | 3 | 2.0 | 8.0 | 10.97 | 2 | 216.3 | 146.2 | 1.007 | 12.40 |
| 194 | 3 | 2.0 | 8.0 | 10.97 | 2 | 221.6 | 146.2 | 1.038 | 11.55 |
| 194 | 3 | 2.0 | 8.0 | 10.97 | 2 | 226.3 | 145.5 | 1.026 | 10.88 |
| 194 | 3 | 2.0 | 8.0 | 10.97 | 2 | 215.7 | 145.5 | 1.007 | 12.39 |
| 194 | 3 | 2.0 | 8.0 | 10.97 | 2 | 221.0 | 145.5 | 1.039 | 11.53 |
| 194 | 3 | 2.0 | 8.0 | 10.97 | 2 | 225.7 | 145.4 | 1.026 | 10.95 |
| 194 | 3 | 2.0 | 8.0 | 10.97 | 2 | 215.1 | 145.4 | 1.008 | 12.48 |
| 194 | 3 | 2.0 | 8.0 | 10.97 | 2 | 220.4 | 145.4 | 1.039 | 11.61 |
| 194 | 3 | 2.5 | 10.0 | 11.44 | 2 | 236.3 | 146.2 | 1.275 | 10.20 |
| 194 | 3 | 2.5 | 10.0 | 11.44 | 2 | 224.6 | 146.2 | 1.253 | 11.58 |
| 194 | 3 | 2.5 | 10.0 | 11.44 | 2 | 230.4 | 146.2 | 1.291 | 10.79 |
| 194 | 3 | 2.5 | 10.0 | 11.44 | 2 | 236.4 | 146.1 | 1.275 | 10.17 |
| 194 | 3 | 2.5 | 10.0 | 11.44 | 2 | 224.6 | 146.1 | 1.253 | 11.57 |
| 194 | 3 | 2.5 | 10.0 | 11.44 | 2 | 230.5 | 146.1 | 1.291 | 10.77 |
| 194 | 3 | 2.5 | 10.0 | 11.44 | 2 | 236.4 | 146.2 | 1.275 | 10.18 |
| 194 | 3 | 2.5 | 10.0 | 11.44 | 2 | 224.5 | 146.2 | 1.253 | 11.58 |
| 194 | 3 | 2.5 | 10.0 | 11.44 | 2 | 230.5 | 146.2 | 1.291 | 10.78 |
| 194 | 3 | 2.5 | 10.0 | 11.44 | 2 | 236.3 | 146.0 | 1.275 | 10.17 |
| 194 | 3 | 2.5 | 10.0 | 11.44 | 2 | 224.6 | 146.0 | 1.253 | 11.55 |
| 194 | 3 | 2.5 | 10.0 | 11.44 | 2 | 230.4 | 146.0 | 1.292 | 10.76 |
| 194 | 3 | 3.5 | 14.0 | 9.73 | 2 | 254.0 | 146.5 | 1.767 | 7.27 |
| 194 | 3 | 3.5 | 14.0 | 9.73 | 2 | 239.1 | 146.5 | 1.739 | 8.35 |
| 194 | 3 | 3.5 | 14.0 | 9.73 | 2 | 246.6 | 146.5 | 1.792 | 7.74 |
| 194 | 3 | 3.5 | 14.0 | 9.73 | 2 | 254.9 | 146.5 | 1.766 | 7.22 |
| 194 | 3 | 3.5 | 14.0 | 9.73 | 2 | 239.7 | 146.5 | 1.739 | 8.30 |
| 194 | 3 | 3.5 | 14.0 | 9.73 | 2 | 247.3 | 146.5 | 1.791 | 7.69 |
| 194 | 3 | 3.5 | 14.0 | 9.73 | 2 | 254.5 | 146.4 | 1.766 | 7.24 |
| 194 | 3 | 3.5 | 14.0 | 9.73 | 2 | 239.4 | 146.4 | 1.739 | 8.32 |
| 194 | 3 | 3.5 | 14.0 | 9.73 | 2 | 246.9 | 146.4 | 1.791 | 7.70 |
| 194 | 3 | 3.5 | 14.0 | 9.73 | 2 | 253.5 | 146.2 | 1.768 | 7.29 |
| 194 | 3 | 3.5 | 14.0 | 9.73 | 2 | 238.5 | 146.2 | 1.740 | 8.38 |
| 194 | 3 | 3.5 | 14.0 | 9.73 | 2 | 246.0 | 146.2 | 1.792 | 7.76 |
| 194 | 3 | 4.5 | 18.0 | 8.65 | 2 | 268.1 | 146.7 | 2.254 | 5.73 |
| 194 | 3 | 4.5 | 18.0 | 8.65 | 2 | 250.6 | 146.7 | 2.222 | 6.62 |
| 194 | 3 | 4.5 | 18.0 | 8.65 | 2 | 259.4 | 146.7 | 2.287 | 6.11 |
| 194 | 3 | 4.5 | 18.0 | 8.65 | 2 | 267.7 | 146.6 | 2.255 | 5.75 |
| 194 | 3 | 4.5 | 18.0 | 8.65 | 2 | 250.2 | 146.6 | 2.222 | 6.64 |
| 194 | 3 | 4.5 | 18.0 | 8.65 | 2 | 258.9 | 146.6 | 2.288 | 6.13 |
| 194 | 3 | 4.5 | 18.0 | 8.65 | 2 | 267.9 | 146.4 | 2.255 | 5.73 |
| 194 | 3 | 4.5 | 18.0 | 8.65 | 2 | 250.4 | 146.4 | 2.222 | 6.62 |
| 194 | 3 | 4.5 | 18.0 | 8.65 | 2 | 259.2 | 146.4 | 2.288 | 6.11 |
| 194 | 3 | 4.5 | 18.0 | 8.65 | 2 | 267.9 | 146.3 | 2.255 | 5.72 |
| 194 | 3 | 4.5 | 18.0 | 8.65 | 2 | 250.6 | 146.3 | 2.222 | 6.60 |
| 194 | 3 | 4.5 | 18.0 | 8.65 | 2 | 259.3 | 146.3 | 2.288 | 6.10 |
| 194 | 3 | 5.5 | 22.0 | 7.58 | 2 | 282.8 | 146.6 | 2.733 | 4.48 |
| 194 | 3 | 5.5 | 22.0 | 7.58 | 2 | 262.9 | 146.6 | 2.698 | 5.19 |
| 194 | 3 | 5.5 | 22.0 | 7.58 | 2 | 272.8 | 146.6 | 2.775 | 4.79 |
| 194 | 3 | 5.5 | 22.0 | 7.58 | 2 | 283.0 | 146.5 | 2.733 | 4.47 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 194 | 3 | 5.5 | 22.0 | 7.58 | 2 | 262.7 | 146.5 | 2.698 | 5.19 |
| 194 | 3 | 5.5 | 22.0 | 7.58 | 2 | 272.9 | 146.5 | 2.775 | 4.78 |
| 194 | 3 | 5.5 | 22.0 | 7.58 | 2 | 283.7 | 146.6 | 2.732 | 4.45 |
| 194 | 3 | 5.5 | 22.0 | 7.58 | 2 | 263.3 | 146.6 | 2.697 | 5.18 |
| 194 | 3 | 5.5 | 22.0 | 7.58 | 2 | 273.5 | 146.6 | 2.774 | 4.76 |
| 194 | 3 | 5.5 | 22.0 | 7.58 | 2 | 282.9 | 146.6 | 2.733 | 4.48 |
| 194 | 3 | 5.5 | 22.0 | 7.58 | 2 | 263.1 | 146.6 | 2.697 | 5.18 |
| 194 | 3 | 5.5 | 22.0 | 7.58 | 2 | 273.0 | 146.6 | 2.775 | 4.78 |
| 195 | 3 | 1.0 | 4.0 | 17.20 | 2 | 204.9 | 147.3 | .518 | 23.86 |
| 195 | 3 | 1.0 | 4.0 | 17.20 | 2 | 195.4 | 147.3 | .509 | 28.23 |
| 195 | 3 | 1.0 | 4.0 | 17.20 | 2 | 200.2 | 147.3 | .525 | 25.73 |
| 195 | 3 | 1.0 | 4.0 | 17.20 | 2 | 203.6 | 147.2 | .519 | 24.39 |
| 195 | 3 | 1.0 | 4.0 | 17.20 | 2 | 194.3 | 147.2 | .509 | 28.85 |
| 195 | 3 | 1.0 | 4.0 | 17.20 | 2 | 199.0 | 147.2 | .525 | 26.30 |
| 195 | 3 | 1.0 | 4.0 | 17.20 | 2 | 203.8 | 147.5 | .519 | 24.42 |
| 195 | 3 | 1.0 | 4.0 | 17.20 | 2 | 194.5 | 147.5 | .509 | 28.96 |
| 195 | 3 | 1.0 | 4.0 | 17.20 | 2 | 199.1 | 147.5 | .525 | 26.36 |
| 195 | 3 | 1.0 | 4.0 | 17.20 | 2 | 204.4 | 147.8 | .518 | 24.32 |
| 195 | 3 | 1.0 | 4.0 | 17.20 | 2 | 195.2 | 147.8 | .509 | 28.72 |
| 195 | 3 | 1.0 | 4.0 | 17.20 | 2 | 199.8 | 147.8 | .525 | 26.21 |
| 195 | 3 | 1.5 | 6.0 | 14.03 | 2 | 217.3 | 147.3 | .772 | 16.05 |
| 195 | 3 | 1.5 | 6.0 | 14.03 | 2 | 207.6 | 147.3 | .758 | 18.44 |
| 195 | 3 | 1.5 | 6.0 | 14.03 | 2 | 212.4 | 147.3 | .782 | 17.08 |
| 195 | 3 | 1.5 | 6.0 | 14.03 | 2 | 217.3 | 147.4 | .772 | 16.06 |
| 195 | 3 | 1.5 | 6.0 | 14.03 | 2 | 207.6 | 147.4 | .758 | 18.45 |
| 195 | 3 | 1.5 | 6.0 | 14.03 | 2 | 212.4 | 147.4 | .782 | 17.09 |
| 195 | 3 | 1.5 | 6.0 | 14.03 | 2 | 217.5 | 147.6 | .772 | 16.06 |
| 195 | 3 | 1.5 | 6.0 | 14.03 | 2 | 207.7 | 147.6 | .758 | 18.47 |
| 195 | 3 | 1.5 | 6.0 | 14.03 | 2 | 212.6 | 147.6 | .782 | 17.10 |
| 195 | 3 | 1.5 | 6.0 | 14.03 | 2 | 217.7 | 147.7 | .772 | 16.04 |
| 195 | 3 | 1.5 | 6.0 | 14.03 | 2 | 208.0 | 147.7 | .758 | 18.40 |
| 195 | 3 | 1.5 | 6.0 | 14.03 | 2 | 212.9 | 147.7 | .782 | 17.06 |
| 195 | 3 | 2.0 | 8.0 | 12.30 | 2 | 227.4 | 146.9 | 1.024 | 12.25 |
| 195 | 3 | 2.0 | 8.0 | 12.30 | 2 | 217.3 | 146.9 | 1.006 | 13.85 |
| 195 | 3 | 2.0 | 8.0 | 12.30 | 2 | 222.4 | 146.9 | 1.037 | 12.94 |
| 195 | 3 | 2.0 | 8.0 | 12.30 | 2 | 226.8 | 146.2 | 1.025 | 12.23 |
| 195 | 3 | 2.0 | 8.0 | 12.30 | 2 | 216.3 | 146.2 | 1.007 | 13.91 |
| 195 | 3 | 2.0 | 8.0 | 12.30 | 2 | 221.6 | 146.2 | 1.038 | 12.95 |
| 195 | 3 | 2.0 | 8.0 | 12.30 | 2 | 226.3 | 145.5 | 1.026 | 12.20 |
| 195 | 3 | 2.0 | 8.0 | 12.30 | 2 | 215.7 | 145.5 | 1.007 | 13.88 |
| 195 | 3 | 2.0 | 8.0 | 12.30 | 2 | 221.0 | 145.5 | 1.039 | 12.93 |
| 195 | 3 | 2.0 | 8.0 | 12.30 | 2 | 225.7 | 145.4 | 1.026 | 12.28 |
| 195 | 3 | 2.0 | 8.0 | 12.30 | 2 | 215.1 | 145.4 | 1.008 | 13.99 |
| 195 | 3 | 2.0 | 8.0 | 12.30 | 2 | 220.4 | 145.4 | 1.039 | 13.02 |
| 195 | 3 | 2.5 | 10.0 | 11.10 | 2 | 236.3 | 146.2 | 1.275 | 9.89 |
| 195 | 3 | 2.5 | 10.0 | 11.10 | 2 | 224.6 | 146.2 | 1.253 | 11.23 |
| 195 | 3 | 2.5 | 10.0 | 11.10 | 2 | 230.4 | 146.2 | 1.291 | 10.47 |
| 195 | 3 | 2.5 | 10.0 | 11.10 | 2 | 236.4 | 146.1 | 1.275 | 9.86 |
| 195 | 3 | 2.5 | 10.0 | 11.10 | 2 | 224.6 | 146.1 | 1.253 | 11.22 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 195 | 3 | 2.5 | 10.0 | 11.10 | 2 | 230.5 | 146.1 | 1.291 | 10.45 |
| 195 | 3 | 2.5 | 10.0 | 11.10 | 2 | 236.4 | 146.2 | 1.275 | 9.87 |
| 195 | 3 | 2.5 | 10.0 | 11.10 | 2 | 224.5 | 146.2 | 1.253 | 11.24 |
| 195 | 3 | 2.5 | 10.0 | 11.10 | 2 | 230.5 | 146.2 | 1.291 | 10.46 |
| 195 | 3 | 2.5 | 10.0 | 11.10 | 2 | 236.3 | 146.0 | 1.275 | 9.86 |
| 195 | 3 | 2.5 | 10.0 | 11.10 | 2 | 224.6 | 146.0 | 1.253 | 11.20 |
| 195 | 3 | 2.5 | 10.0 | 11.10 | 2 | 230.4 | 146.0 | 1.292 | 10.44 |
| 195 | 3 | 3.5 | 14.0 | 9.57 | 2 | 254.0 | 146.5 | 1.767 | 7.15 |
| 195 | 3 | 3.5 | 14.0 | 9.57 | 2 | 239.1 | 146.5 | 1.739 | 8.21 |
| 195 | 3 | 3.5 | 14.0 | 9.57 | 2 | 246.6 | 146.5 | 1.792 | 7.60 |
| 195 | 3 | 3.5 | 14.0 | 9.57 | 2 | 254.9 | 146.5 | 1.766 | 7.10 |
| 195 | 3 | 3.5 | 14.0 | 9.57 | 2 | 239.7 | 146.5 | 1.739 | 8.16 |
| 195 | 3 | 3.5 | 14.0 | 9.57 | 2 | 247.3 | 146.5 | 1.791 | 7.55 |
| 195 | 3 | 3.5 | 14.0 | 9.57 | 2 | 254.5 | 146.4 | 1.766 | 7.11 |
| 195 | 3 | 3.5 | 14.0 | 9.57 | 2 | 239.4 | 146.4 | 1.739 | 8.18 |
| 195 | 3 | 3.5 | 14.0 | 9.57 | 2 | 246.9 | 146.4 | 1.791 | 7.57 |
| 195 | 3 | 3.5 | 14.0 | 9.57 | 2 | 253.5 | 146.2 | 1.768 | 7.17 |
| 195 | 3 | 3.5 | 14.0 | 9.57 | 2 | 238.5 | 146.2 | 1.740 | 8.24 |
| 195 | 3 | 3.5 | 14.0 | 9.57 | 2 | 246.0 | 146.2 | 1.792 | 7.63 |
| 195 | 3 | 4.5 | 18.0 | 8.45 | 2 | 268.1 | 146.7 | 2.254 | 5.60 |
| 195 | 3 | 4.5 | 18.0 | 8.45 | 2 | 250.6 | 146.7 | 2.222 | 6.47 |
| 195 | 3 | 4.5 | 18.0 | 8.45 | 2 | 259.4 | 146.7 | 2.287 | 5.98 |
| 195 | 3 | 4.5 | 18.0 | 8.45 | 2 | 267.7 | 146.6 | 2.255 | 5.62 |
| 195 | 3 | 4.5 | 18.0 | 8.45 | 2 | 250.2 | 146.6 | 2.222 | 6.49 |
| 195 | 3 | 4.5 | 18.0 | 8.45 | 2 | 258.9 | 146.6 | 2.288 | 6.00 |
| 195 | 3 | 4.5 | 18.0 | 8.45 | 2 | 267.9 | 146.4 | 2.255 | 5.60 |
| 195 | 3 | 4.5 | 18.0 | 8.45 | 2 | 250.4 | 146.4 | 2.222 | 6.47 |
| 195 | 3 | 4.5 | 18.0 | 8.45 | 2 | 259.2 | 146.4 | 2.288 | 5.97 |
| 195 | 3 | 4.5 | 18.0 | 8.45 | 2 | 267.9 | 146.3 | 2.255 | 5.59 |
| 195 | 3 | 4.5 | 18.0 | 8.45 | 2 | 250.6 | 146.3 | 2.222 | 6.45 |
| 195 | 3 | 4.5 | 18.0 | 8.45 | 2 | 259.3 | 146.3 | 2.288 | 5.96 |
| 195 | 3 | 5.5 | 22.0 | 7.70 | 2 | 282.8 | 146.6 | 2.733 | 4.55 |
| 195 | 3 | 5.5 | 22.0 | 7.70 | 2 | 262.9 | 146.6 | 2.698 | 5.27 |
| 195 | 3 | 5.5 | 22.0 | 7.70 | 2 | 272.8 | 146.6 | 2.775 | 4.86 |
| 195 | 3 | 5.5 | 22.0 | 7.70 | 2 | 283.0 | 146.5 | 2.733 | 4.54 |
| 195 | 3 | 5.5 | 22.0 | 7.70 | 2 | 262.7 | 146.5 | 2.698 | 5.28 |
| 195 | 3 | 5.5 | 22.0 | 7.70 | 2 | 272.9 | 146.5 | 2.775 | 4.86 |
| 195 | 3 | 5.5 | 22.0 | 7.70 | 2 | 283.7 | 146.6 | 2.732 | 4.53 |
| 195 | 3 | 5.5 | 22.0 | 7.70 | 2 | 263.3 | 146.6 | 2.697 | 5.26 |
| 195 | 3 | 5.5 | 22.0 | 7.70 | 2 | 273.5 | 146.6 | 2.774 | 4.84 |
| 195 | 3 | 5.5 | 22.0 | 7.70 | 2 | 282.9 | 146.6 | 2.733 | 4.55 |
| 195 | 3 | 5.5 | 22.0 | 7.70 | 2 | 263.1 | 146.6 | 2.697 | 5.27 |
| 195 | 3 | 5.5 | 22.0 | 7.70 | 2 | 273.0 | 146.6 | 2.775 | 4.86 |
| 211 | 3 | 1.0 | 4.0 | 14.16 | 2 | 130.0 | 85.4 | .563 | 25.67 |
| 211 | 3 | 1.0 | 4.0 | 14.16 | 2 | 125.9 | 85.4 | .551 | 27.95 |
| 211 | 3 | 1.0 | 4.0 | 14.16 | 2 | 127.9 | 85.4 | .570 | 26.63 |
| 211 | 3 | 1.0 | 4.0 | 14.16 | 2 | 128.7 | 85.4 | .564 | 26.48 |
| 211 | 3 | 1.0 | 4.0 | 14.16 | 2 | 126.1 | 85.4 | .551 | 27.81 |
| 211 | 3 | 1.0 | 4.0 | 14.16 | 2 | 127.4 | 85.4 | .570 | 27.01 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 211 | 3 | 1.0 | 4.0 | 14.16 | 2 | 129.1 | 85.2 | .564 | 26.11 |
| 211 | 3 | 1.0 | 4.0 | 14.16 | 2 | 126.5 | 85.2 | .551 | 27.42 |
| 211 | 3 | 1.0 | 4.0 | 14.16 | 2 | 127.8 | 85.2 | .570 | 26.63 |
| 211 | 3 | 1.5 | 6.0 | 16.93 | 2 | 146.1 | 86.2 | .836 | 22.91 |
| 211 | 3 | 1.5 | 6.0 | 16.93 | 2 | 138.9 | 86.2 | .820 | 25.73 |
| 211 | 3 | 1.5 | 6.0 | 16.93 | 2 | 142.5 | 86.2 | .846 | 24.12 |
| 211 | 3 | 1.5 | 6.0 | 16.93 | 2 | 146.6 | 86.2 | .836 | 22.72 |
| 211 | 3 | 1.5 | 6.0 | 16.93 | 2 | 139.2 | 86.2 | .820 | 25.62 |
| 211 | 3 | 1.5 | 6.0 | 16.93 | 2 | 142.9 | 86.2 | .846 | 23.97 |
| 211 | 3 | 1.5 | 6.0 | 16.93 | 2 | 147.2 | 86.4 | .836 | 22.57 |
| 211 | 3 | 1.5 | 6.0 | 16.93 | 2 | 139.5 | 86.4 | .820 | 25.53 |
| 211 | 3 | 1.5 | 6.0 | 16.93 | 2 | 143.3 | 86.4 | .846 | 23.85 |
| 211 | 3 | 2.0 | 8.0 | 10.22 | 2 | 156.2 | 86.2 | 1.108 | 11.85 |
| 211 | 3 | 2.0 | 8.0 | 10.22 | 2 | 147.4 | 86.2 | 1.088 | 13.39 |
| 211 | 3 | 2.0 | 8.0 | 10.22 | 2 | 151.8 | 86.2 | 1.122 | 12.51 |
| 211 | 3 | 2.0 | 8.0 | 10.22 | 2 | 156.7 | 86.5 | 1.107 | 11.81 |
| 211 | 3 | 2.0 | 8.0 | 10.22 | 2 | 144.5 | 86.5 | 1.090 | 14.14 |
| 211 | 3 | 2.0 | 8.0 | 10.22 | 2 | 150.6 | 86.5 | 1.123 | 12.80 |
| 211 | 3 | 2.0 | 8.0 | 10.22 | 2 | 156.4 | 86.6 | 1.108 | 11.88 |
| 211 | 3 | 2.0 | 8.0 | 10.22 | 2 | 147.7 | 86.6 | 1.087 | 13.42 |
| 211 | 3 | 2.0 | 8.0 | 10.22 | 2 | 152.0 | 86.6 | 1.122 | 12.55 |
| 211 | 3 | 2.5 | 10.0 | 11.03 | 2 | 165.9 | 84.4 | 1.378 | 11.00 |
| 211 | 3 | 2.5 | 10.0 | 11.03 | 2 | 155.5 | 84.4 | 1.354 | 12.45 |
| 211 | 3 | 2.5 | 10.0 | 11.03 | 2 | 160.7 | 84.4 | 1.396 | 11.63 |
| 211 | 3 | 2.5 | 10.0 | 11.03 | 2 | 166.1 | 84.5 | 1.378 | 10.99 |
| 211 | 3 | 2.5 | 10.0 | 11.03 | 2 | 155.6 | 84.5 | 1.354 | 12.46 |
| 211 | 3 | 2.5 | 10.0 | 11.03 | 2 | 160.8 | 84.5 | 1.396 | 11.63 |
| 211 | 3 | 2.5 | 10.0 | 11.03 | 2 | 166.2 | 84.2 | 1.378 | 10.93 |
| 211 | 3 | 2.5 | 10.0 | 11.03 | 2 | 155.9 | 84.2 | 1.354 | 12.36 |
| 211 | 3 | 2.5 | 10.0 | 11.03 | 2 | 161.1 | 84.2 | 1.396 | 11.55 |
| 211 | 3 | 3.5 | 14.0 | 8.91 | 2 | 179.4 | 83.6 | 1.915 | 7.58 |
| 211 | 3 | 3.5 | 14.0 | 8.91 | 2 | 166.8 | 83.6 | 1.884 | 8.62 |
| 211 | 3 | 3.5 | 14.0 | 8.91 | 2 | 173.1 | 83.6 | 1.941 | 8.03 |
| 211 | 3 | 3.5 | 14.0 | 8.91 | 2 | 179.5 | 83.6 | 1.914 | 7.56 |
| 211 | 3 | 3.5 | 14.0 | 8.91 | 2 | 166.9 | 83.6 | 1.884 | 8.61 |
| 211 | 3 | 3.5 | 14.0 | 8.91 | 2 | 173.2 | 83.6 | 1.941 | 8.01 |
| 211 | 3 | 3.5 | 14.0 | 8.91 | 2 | 182.7 | 83.6 | 1.911 | 7.33 |
| 211 | 3 | 3.5 | 14.0 | 8.91 | 2 | 169.9 | 83.6 | 1.880 | 8.31 |
| 211 | 3 | 3.5 | 14.0 | 8.91 | 2 | 176.3 | 83.6 | 1.937 | 7.75 |
| 211 | 3 | 4.5 | 18.0 | 7.27 | 2 | 196.1 | 83.3 | 2.437 | 5.25 |
| 211 | 3 | 4.5 | 18.0 | 7.27 | 2 | 180.7 | 83.3 | 2.402 | 6.01 |
| 211 | 3 | 4.5 | 18.0 | 7.27 | 2 | 188.4 | 83.3 | 2.473 | 5.58 |
| 211 | 3 | 4.5 | 18.0 | 7.27 | 2 | 197.2 | 83.5 | 2.435 | 5.21 |
| 211 | 3 | 4.5 | 18.0 | 7.27 | 2 | 181.9 | 83.5 | 2.400 | 5.95 |
| 211 | 3 | 4.5 | 18.0 | 7.27 | 2 | 189.6 | 83.5 | 2.471 | 5.53 |
| 211 | 3 | 4.5 | 18.0 | 7.27 | 2 | 197.1 | 61.4 | 2.469 | 4.40 |
| 211 | 3 | 4.5 | 18.0 | 7.27 | 2 | 182.2 | 61.4 | 2.433 | 4.89 |
| 211 | 3 | 4.5 | 18.0 | 7.27 | 2 | 189.6 | 61.4 | 2.505 | 4.61 |
| 211 | 3 | 5.5 | 22.0 | 6.87 | 2 | 211.0 | 81.7 | 2.955 | 4.34 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 211 | 3 | 5.5 | 22.0 | 6.87 | 2 | 194.9 | 81.7 | 2.913 | 4.90 |
| 211 | 3 | 5.5 | 22.0 | 6.87 | 2 | 203.0 | 81.7 | 2.999 | 4.58 |
| 211 | 3 | 5.5 | 22.0 | 6.87 | 2 | 210.4 | 81.9 | 2.956 | 4.37 |
| 211 | 3 | 5.5 | 22.0 | 6.87 | 2 | 194.0 | 81.9 | 2.914 | 4.95 |
| 211 | 3 | 5.5 | 22.0 | 6.87 | 2 | 202.2 | 81.9 | 3.000 | 4.62 |
| 211 | 3 | 5.5 | 22.0 | 6.87 | 2 | 211.9 | 81.9 | 2.953 | 4.32 |
| 211 | 3 | 5.5 | 22.0 | 6.87 | 2 | 195.0 | 81.9 | 2.913 | 4.91 |
| 211 | 3 | 5.5 | 22.0 | 6.87 | 2 | 203.5 | 81.9 | 2.997 | 4.57 |
| 211 | 3 | 5.5 | 22.0 | 6.87 | 2 | 212.1 | 81.9 | 2.953 | 4.31 |
| 211 | 3 | 5.5 | 22.0 | 6.87 | 2 | 195.6 | 81.9 | 2.912 | 4.88 |
| 211 | 3 | 5.5 | 22.0 | 6.87 | 2 | 203.8 | 81.9 | 2.997 | 4.56 |
| 212 | 3 | 1.0 | 4.0 | 11.93 | 2 | 130.0 | 85.4 | .563 | 21.63 |
| 212 | 3 | 1.0 | 4.0 | 11.93 | 2 | 125.9 | 85.4 | .551 | 23.55 |
| 212 | 3 | 1.0 | 4.0 | 11.93 | 2 | 127.9 | 85.4 | .570 | 22.45 |
| 212 | 3 | 1.0 | 4.0 | 11.93 | 2 | 128.7 | 85.4 | .564 | 22.32 |
| 212 | 3 | 1.0 | 4.0 | 11.93 | 2 | 126.1 | 85.4 | .551 | 23.44 |
| 212 | 3 | 1.0 | 4.0 | 11.93 | 2 | 127.4 | 85.4 | .570 | 22.76 |
| 212 | 3 | 1.0 | 4.0 | 11.93 | 2 | 129.1 | 85.2 | .564 | 22.00 |
| 212 | 3 | 1.0 | 4.0 | 11.93 | 2 | 126.5 | 85.2 | .551 | 23.11 |
| 212 | 3 | 1.0 | 4.0 | 11.93 | 2 | 127.8 | 85.2 | .570 | 22.44 |
| 212 | 3 | 1.5 | 6.0 | 12.04 | 2 | 146.1 | 86.2 | .836 | 16.28 |
| 212 | 3 | 1.5 | 6.0 | 12.04 | 2 | 138.9 | 86.2 | .820 | 18.29 |
| 212 | 3 | 1.5 | 6.0 | 12.04 | 2 | 142.5 | 86.2 | .846 | 17.14 |
| 212 | 3 | 1.5 | 6.0 | 12.04 | 2 | 146.6 | 86.2 | .836 | 16.15 |
| 212 | 3 | 1.5 | 6.0 | 12.04 | 2 | 139.2 | 86.2 | .820 | 18.21 |
| 212 | 3 | 1.5 | 6.0 | 12.04 | 2 | 142.9 | 86.2 | .846 | 17.04 |
| 212 | 3 | 1.5 | 6.0 | 12.04 | 2 | 147.2 | 86.4 | .836 | 16.04 |
| 212 | 3 | 1.5 | 6.0 | 12.04 | 2 | 139.5 | 86.4 | .820 | 18.15 |
| 212 | 3 | 1.5 | 6.0 | 12.04 | 2 | 143.3 | 86.4 | .846 | 16.95 |
| 212 | 3 | 2.0 | 8.0 | 9.34 | 2 | 156.2 | 86.2 | 1.108 | 10.82 |
| 212 | 3 | 2.0 | 8.0 | 9.34 | 2 | 147.4 | 86.2 | 1.088 | 12.23 |
| 212 | 3 | 2.0 | 8.0 | 9.34 | 2 | 151.8 | 86.2 | 1.122 | 11.43 |
| 212 | 3 | 2.0 | 8.0 | 9.34 | 2 | 156.7 | 86.5 | 1.107 | 10.78 |
| 212 | 3 | 2.0 | 8.0 | 9.34 | 2 | 144.5 | 86.5 | 1.090 | 12.91 |
| 212 | 3 | 2.0 | 8.0 | 9.34 | 2 | 150.6 | 86.5 | 1.123 | 11.69 |
| 212 | 3 | 2.0 | 8.0 | 9.34 | 2 | 156.4 | 86.6 | 1.108 | 10.85 |
| 212 | 3 | 2.0 | 8.0 | 9.34 | 2 | 147.7 | 86.6 | 1.087 | 12.26 |
| 212 | 3 | 2.0 | 8.0 | 9.34 | 2 | 152.0 | 86.6 | 1.122 | 11.46 |
| 212 | 3 | 2.5 | 10.0 | 9.54 | 2 | 165.9 | 84.4 | 1.378 | 9.51 |
| 212 | 3 | 2.5 | 10.0 | 9.54 | 2 | 155.5 | 84.4 | 1.354 | 10.77 |
| 212 | 3 | 2.5 | 10.0 | 9.54 | 2 | 160.7 | 84.4 | 1.396 | 10.05 |
| 212 | 3 | 2.5 | 10.0 | 9.54 | 2 | 166.1 | 84.5 | 1.378 | 9.50 |
| 212 | 3 | 2.5 | 10.0 | 9.54 | 2 | 155.6 | 84.5 | 1.354 | 10.77 |
| 212 | 3 | 2.5 | 10.0 | 9.54 | 2 | 160.8 | 84.5 | 1.396 | 10.05 |
| 212 | 3 | 2.5 | 10.0 | 9.54 | 2 | 166.2 | 84.2 | 1.378 | 9.45 |
| 212 | 3 | 2.5 | 10.0 | 9.54 | 2 | 155.9 | 84.2 | 1.354 | 10.69 |
| 212 | 3 | 2.5 | 10.0 | 9.54 | 2 | 161.1 | 84.2 | 1.396 | 9.98 |
| 212 | 3 | 3.5 | 14.0 | 9.34 | 2 | 179.4 | 83.6 | 1.915 | 7.94 |
| 212 | 3 | 3.5 | 14.0 | 9.34 | 2 | 166.8 | 83.6 | 1.884 | 9.03 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 212 | 3 | 3.5 | 14.0 | 9.34 | 2 | 173.1 | 83.6 | 1.941 | 8.41 |
| 212 | 3 | 3.5 | 14.0 | 9.34 | 2 | 179.5 | 83.6 | 1.914 | 7.93 |
| 212 | 3 | 3.5 | 14.0 | 9.34 | 2 | 166.9 | 83.6 | 1.884 | 9.02 |
| 212 | 3 | 3.5 | 14.0 | 9.34 | 2 | 173.2 | 83.6 | 1.941 | 8.40 |
| 212 | 3 | 3.5 | 14.0 | 9.34 | 2 | 182.7 | 83.6 | 1.911 | 7.68 |
| 212 | 3 | 3.5 | 14.0 | 9.34 | 2 | 169.9 | 83.6 | 1.880 | 8.71 |
| 212 | 3 | 3.5 | 14.0 | 9.34 | 2 | 176.3 | 83.6 | 1.937 | 8.12 |
| 212 | 3 | 4.5 | 18.0 | 7.23 | 2 | 196.1 | 83.3 | 2.437 | 5.23 |
| 212 | 3 | 4.5 | 18.0 | 7.23 | 2 | 180.7 | 83.3 | 2.402 | 5.98 |
| 212 | 3 | 4.5 | 18.0 | 7.23 | 2 | 188.4 | 83.3 | 2.473 | 5.55 |
| 212 | 3 | 4.5 | 18.0 | 7.23 | 2 | 197.2 | 83.5 | 2.435 | 5.19 |
| 212 | 3 | 4.5 | 18.0 | 7.23 | 2 | 181.9 | 83.5 | 2.400 | 5.92 |
| 212 | 3 | 4.5 | 18.0 | 7.23 | 2 | 189.6 | 83.5 | 2.471 | 5.50 |
| 212 | 3 | 4.5 | 18.0 | 7.23 | 2 | 197.1 | 61.4 | 2.469 | 4.38 |
| 212 | 3 | 4.5 | 18.0 | 7.23 | 2 | 182.2 | 61.4 | 2.433 | 4.86 |
| 212 | 3 | 4.5 | 18.0 | 7.23 | 2 | 189.6 | 61.4 | 2.505 | 4.59 |
| 212 | 3 | 5.5 | 22.0 | 6.67 | 2 | 211.0 | 81.7 | 2.955 | 4.21 |
| 212 | 3 | 5.5 | 22.0 | 6.67 | 2 | 194.9 | 81.7 | 2.913 | 4.76 |
| 212 | 3 | 5.5 | 22.0 | 6.67 | 2 | 203.0 | 81.7 | 2.999 | 4.45 |
| 212 | 3 | 5.5 | 22.0 | 6.67 | 2 | 210.4 | 81.9 | 2.956 | 4.24 |
| 212 | 3 | 5.5 | 22.0 | 6.67 | 2 | 194.0 | 81.9 | 2.914 | 4.80 |
| 212 | 3 | 5.5 | 22.0 | 6.67 | 2 | 202.2 | 81.9 | 3.000 | 4.48 |
| 212 | 3 | 5.5 | 22.0 | 6.67 | 2 | 211.9 | 81.9 | 2.953 | 4.19 |
| 212 | 3 | 5.5 | 22.0 | 6.67 | 2 | 195.0 | 81.9 | 2.913 | 4.76 |
| 212 | 3 | 5.5 | 22.0 | 6.67 | 2 | 203.5 | 81.9 | 2.997 | 4.44 |
| 212 | 3 | 5.5 | 22.0 | 6.67 | 2 | 212.1 | 81.9 | 2.953 | 4.18 |
| 212 | 3 | 5.5 | 22.0 | 6.67 | 2 | 195.6 | 81.9 | 2.912 | 4.74 |
| 212 | 3 | 5.5 | 22.0 | 6.67 | 2 | 203.8 | 81.9 | 2.997 | 4.42 |
| 213 | 3 | 1.0 | 4.0 | 12.24 | 2 | 130.0 | 85.4 | .563 | 22.20 |
| 213 | 3 | 1.0 | 4.0 | 12.24 | 2 | 125.9 | 85.4 | .551 | 24.17 |
| 213 | 3 | 1.0 | 4.0 | 12.24 | 2 | 127.9 | 85.4 | .570 | 23.03 |
| 213 | 3 | 1.0 | 4.0 | 12.24 | 2 | 128.7 | 85.4 | .564 | 22.90 |
| 213 | 3 | 1.0 | 4.0 | 12.24 | 2 | 126.1 | 85.4 | .551 | 24.05 |
| 213 | 3 | 1.0 | 4.0 | 12.24 | 2 | 127.4 | 85.4 | .570 | 23.35 |
| 213 | 3 | 1.0 | 4.0 | 12.24 | 2 | 129.1 | 85.2 | .564 | 22.58 |
| 213 | 3 | 1.0 | 4.0 | 12.24 | 2 | 126.5 | 85.2 | .551 | 23.71 |
| 213 | 3 | 1.0 | 4.0 | 12.24 | 2 | 127.8 | 85.2 | .570 | 23.02 |
| 213 | 3 | 1.5 | 6.0 | 11.16 | 2 | 146.1 | 86.2 | .836 | 15.09 |
| 213 | 3 | 1.5 | 6.0 | 11.16 | 2 | 138.9 | 86.2 | .820 | 16.95 |
| 213 | 3 | 1.5 | 6.0 | 11.16 | 2 | 142.5 | 86.2 | .846 | 15.89 |
| 213 | 3 | 1.5 | 6.0 | 11.16 | 2 | 146.6 | 86.2 | .836 | 14.97 |
| 213 | 3 | 1.5 | 6.0 | 11.16 | 2 | 139.2 | 86.2 | .820 | 16.88 |
| 213 | 3 | 1.5 | 6.0 | 11.16 | 2 | 142.9 | 86.2 | .846 | 15.79 |
| 213 | 3 | 1.5 | 6.0 | 11.16 | 2 | 147.2 | 86.4 | .836 | 14.87 |
| 213 | 3 | 1.5 | 6.0 | 11.16 | 2 | 139.5 | 86.4 | .820 | 16.82 |
| 213 | 3 | 1.5 | 6.0 | 11.16 | 2 | 143.3 | 86.4 | .846 | 15.71 |
| 213 | 3 | 2.0 | 8.0 | 13.30 | 2 | 156.2 | 86.2 | 1.108 | 15.41 |
| 213 | 3 | 2.0 | 8.0 | 13.30 | 2 | 147.4 | 86.2 | 1.088 | 17.41 |
| 213 | 3 | 2.0 | 8.0 | 13.30 | 2 | 151.8 | 86.2 | 1.122 | 16.27 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 213 | 3 | 2.0 | 8.0 | 13.30 | 2 | 156.7 | 86.5 | 1.107 | 15.35 |
| 213 | 3 | 2.0 | 8.0 | 13.30 | 2 | 144.5 | 86.5 | 1.090 | 18.38 |
| 213 | 3 | 2.0 | 8.0 | 13.30 | 2 | 150.6 | 86.5 | 1.123 | 16.65 |
| 213 | 3 | 2.0 | 8.0 | 13.30 | 2 | 156.4 | 86.6 | 1.108 | 15.45 |
| 213 | 3 | 2.0 | 8.0 | 13.30 | 2 | 147.7 | 86.6 | 1.087 | 17.46 |
| 213 | 3 | 2.0 | 8.0 | 13.30 | 2 | 152.0 | 86.6 | 1.122 | 16.32 |
| 213 | 3 | 2.5 | 10.0 | 9.77 | 2 | 165.9 | 84.4 | 1.378 | 9.75 |
| 213 | 3 | 2.5 | 10.0 | 9.77 | 2 | 155.5 | 84.4 | 1.354 | 11.03 |
| 213 | 3 | 2.5 | 10.0 | 9.77 | 2 | 160.7 | 84.4 | 1.396 | 10.30 |
| 213 | 3 | 2.5 | 10.0 | 9.77 | 2 | 166.1 | 84.5 | 1.378 | 9.74 |
| 213 | 3 | 2.5 | 10.0 | 9.77 | 2 | 155.6 | 84.5 | 1.354 | 11.04 |
| 213 | 3 | 2.5 | 10.0 | 9.77 | 2 | 160.8 | 84.5 | 1.396 | 10.30 |
| 213 | 3 | 2.5 | 10.0 | 9.77 | 2 | 166.2 | 84.2 | 1.378 | 9.68 |
| 213 | 3 | 2.5 | 10.0 | 9.77 | 2 | 155.9 | 84.2 | 1.354 | 10.95 |
| 213 | 3 | 2.5 | 10.0 | 9.77 | 2 | 161.1 | 84.2 | 1.396 | 10.23 |
| 213 | 3 | 3.5 | 14.0 | 8.16 | 2 | 179.4 | 83.6 | 1.915 | 6.93 |
| 213 | 3 | 3.5 | 14.0 | 8.16 | 2 | 166.8 | 83.6 | 1.884 | 7.89 |
| 213 | 3 | 3.5 | 14.0 | 8.16 | 2 | 173.1 | 83.6 | 1.941 | 7.34 |
| 213 | 3 | 3.5 | 14.0 | 8.16 | 2 | 179.5 | 83.6 | 1.914 | 6.92 |
| 213 | 3 | 3.5 | 14.0 | 8.16 | 2 | 166.9 | 83.6 | 1.884 | 7.88 |
| 213 | 3 | 3.5 | 14.0 | 8.16 | 2 | 173.2 | 83.6 | 1.941 | 7.33 |
| 213 | 3 | 3.5 | 14.0 | 8.16 | 2 | 182.7 | 83.6 | 1.911 | 6.71 |
| 213 | 3 | 3.5 | 14.0 | 8.16 | 2 | 169.9 | 83.6 | 1.880 | 7.61 |
| 213 | 3 | 3.5 | 14.0 | 8.16 | 2 | 176.3 | 83.6 | 1.937 | 7.09 |
| 213 | 3 | 4.5 | 18.0 | 7.53 | 2 | 196.1 | 83.3 | 2.437 | 5.44 |
| 213 | 3 | 4.5 | 18.0 | 7.53 | 2 | 180.7 | 83.3 | 2.402 | 6.23 |
| 213 | 3 | 4.5 | 18.0 | 7.53 | 2 | 188.4 | 83.3 | 2.473 | 5.78 |
| 213 | 3 | 4.5 | 18.0 | 7.53 | 2 | 197.2 | 83.5 | 2.435 | 5.40 |
| 213 | 3 | 4.5 | 18.0 | 7.53 | 2 | 181.9 | 83.5 | 2.400 | 6.17 |
| 213 | 3 | 4.5 | 18.0 | 7.53 | 2 | 189.6 | 83.5 | 2.471 | 5.73 |
| 213 | 3 | 4.5 | 18.0 | 7.53 | 2 | 197.1 | 61.4 | 2.469 | 4.56 |
| 213 | 3 | 4.5 | 18.0 | 7.53 | 2 | 182.2 | 61.4 | 2.433 | 5.07 |
| 213 | 3 | 4.5 | 18.0 | 7.53 | 2 | 189.6 | 61.4 | 2.505 | 4.78 |
| 213 | 3 | 5.5 | 22.0 | 7.36 | 2 | 211.0 | 81.7 | 2.955 | 4.65 |
| 213 | 3 | 5.5 | 22.0 | 7.36 | 2 | 194.9 | 81.7 | 2.913 | 5.26 |
| 213 | 3 | 5.5 | 22.0 | 7.36 | 2 | 203.0 | 81.7 | 2.999 | 4.91 |
| 213 | 3 | 5.5 | 22.0 | 7.36 | 2 | 210.4 | 81.9 | 2.956 | 4.68 |
| 213 | 3 | 5.5 | 22.0 | 7.36 | 2 | 194.0 | 81.9 | 2.914 | 5.30 |
| 213 | 3 | 5.5 | 22.0 | 7.36 | 2 | 202.2 | 81.9 | 3.000 | 4.95 |
| 213 | 3 | 5.5 | 22.0 | 7.36 | 2 | 211.9 | 81.9 | 2.953 | 4.63 |
| 213 | 3 | 5.5 | 22.0 | 7.36 | 2 | 195.0 | 81.9 | 2.913 | 5.26 |
| 213 | 3 | 5.5 | 22.0 | 7.36 | 2 | 203.5 | 81.9 | 2.997 | 4.90 |
| 213 | 3 | 5.5 | 22.0 | 7.36 | 2 | 212.1 | 81.9 | 2.953 | 4.62 |
| 213 | 3 | 5.5 | 22.0 | 7.36 | 2 | 195.6 | 81.9 | 2.912 | 5.23 |
| 213 | 3 | 5.5 | 22.0 | 7.36 | 2 | 203.8 | 81.9 | 2.997 | 4.89 |
| 214 | 3 | 1.0 | 4.0 | 11.96 | 2 | 130.0 | 85.4 | .563 | 21.68 |
| 214 | 3 | 1.0 | 4.0 | 11.96 | 2 | 125.9 | 85.4 | .551 | 23.61 |
| 214 | 3 | 1.0 | 4.0 | 11.96 | 2 | 127.9 | 85.4 | .570 | 22.50 |
| 214 | 3 | 1.0 | 4.0 | 11.96 | 2 | 128.7 | 85.4 | .564 | 22.37 |

| RUN | NO OF PEL | ETHYLENE CC/SC | HYDROGEN CC/SC | CONVERSION | THERMOCOUPLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 214 | 3 | 1.0 | 4.0 | 11.96 | 2 | 126.1 | 85.4 | .551 | 23.49 |
| 214 | 3 | 1.0 | 4.0 | 11.96 | 2 | 127.4 | 85.4 | .570 | 22.81 |
| 214 | 3 | 1.0 | 4.0 | 11.96 | 2 | 129.1 | 85.2 | .564 | 22.06 |
| 214 | 3 | 1.0 | 4.0 | 11.96 | 2 | 126.5 | 85.2 | .551 | 23.16 |
| 214 | 3 | 1.0 | 4.0 | 11.96 | 2 | 127.8 | 85.2 | .570 | 22.49 |
| 214 | 3 | 1.5 | 6.0 | 10.77 | 2 | 146.1 | 86.2 | .836 | 14.57 |
| 214 | 3 | 1.5 | 6.0 | 10.77 | 2 | 138.9 | 86.2 | .820 | 16.36 |
| 214 | 3 | 1.5 | 6.0 | 10.77 | 2 | 142.5 | 86.2 | .846 | 15.34 |
| 214 | 3 | 1.5 | 6.0 | 10.77 | 2 | 146.6 | 86.2 | .836 | 14.45 |
| 214 | 3 | 1.5 | 6.0 | 10.77 | 2 | 139.2 | 86.2 | .820 | 16.29 |
| 214 | 3 | 1.5 | 6.0 | 10.77 | 2 | 142.9 | 86.2 | .846 | 15.24 |
| 214 | 3 | 1.5 | 6.0 | 10.77 | 2 | 147.2 | 86.4 | .836 | 14.36 |
| 214 | 3 | 1.5 | 6.0 | 10.77 | 2 | 139.5 | 86.4 | .820 | 16.24 |
| 214 | 3 | 1.5 | 6.0 | 10.77 | 2 | 143.3 | 86.4 | .846 | 15.17 |
| 214 | 3 | 2.0 | 8.0 | 10.29 | 2 | 156.2 | 86.2 | 1.108 | 11.92 |
| 214 | 3 | 2.0 | 8.0 | 10.29 | 2 | 147.4 | 86.2 | 1.088 | 13.48 |
| 214 | 3 | 2.0 | 8.0 | 10.29 | 2 | 151.8 | 86.2 | 1.122 | 12.59 |
| 214 | 3 | 2.0 | 8.0 | 10.29 | 2 | 156.7 | 86.5 | 1.107 | 11.88 |
| 214 | 3 | 2.0 | 8.0 | 10.29 | 2 | 144.5 | 86.5 | 1.090 | 14.23 |
| 214 | 3 | 2.0 | 8.0 | 10.29 | 2 | 150.6 | 86.5 | 1.123 | 12.89 |
| 214 | 3 | 2.0 | 8.0 | 10.29 | 2 | 156.4 | 86.6 | 1.108 | 11.96 |
| 214 | 3 | 2.0 | 8.0 | 10.29 | 2 | 147.7 | 86.6 | 1.087 | 13.51 |
| 214 | 3 | 2.0 | 8.0 | 10.29 | 2 | 152.0 | 86.6 | 1.122 | 12.63 |
| 214 | 3 | 2.5 | 10.0 | 9.50 | 2 | 165.9 | 84.4 | 1.378 | 9.47 |
| 214 | 3 | 2.5 | 10.0 | 9.50 | 2 | 155.5 | 84.4 | 1.354 | 10.72 |
| 214 | 3 | 2.5 | 10.0 | 9.50 | 2 | 160.7 | 84.4 | 1.396 | 10.01 |
| 214 | 3 | 2.5 | 10.0 | 9.50 | 2 | 166.1 | 84.5 | 1.378 | 9.46 |
| 214 | 3 | 2.5 | 10.0 | 9.50 | 2 | 155.6 | 84.5 | 1.354 | 10.73 |
| 214 | 3 | 2.5 | 10.0 | 9.50 | 2 | 160.8 | 84.5 | 1.396 | 10.01 |
| 214 | 3 | 2.5 | 10.0 | 9.50 | 2 | 166.2 | 84.2 | 1.378 | 9.41 |
| 214 | 3 | 2.5 | 10.0 | 9.50 | 2 | 155.9 | 84.2 | 1.354 | 10.64 |
| 214 | 3 | 2.5 | 10.0 | 9.50 | 2 | 161.1 | 84.2 | 1.396 | 9.94 |
| 214 | 3 | 3.5 | 14.0 | 8.04 | 2 | 179.4 | 83.6 | 1.915 | 6.83 |
| 214 | 3 | 3.5 | 14.0 | 8.04 | 2 | 166.8 | 83.6 | 1.884 | 7.77 |
| 214 | 3 | 3.5 | 14.0 | 8.04 | 2 | 173.1 | 83.6 | 1.941 | 7.24 |
| 214 | 3 | 3.5 | 14.0 | 8.04 | 2 | 179.5 | 83.6 | 1.914 | 6.82 |
| 214 | 3 | 3.5 | 14.0 | 8.04 | 2 | 166.9 | 83.6 | 1.884 | 7.76 |
| 214 | 3 | 3.5 | 14.0 | 8.04 | 2 | 173.2 | 83.6 | 1.941 | 7.23 |
| 214 | 3 | 3.5 | 14.0 | 8.04 | 2 | 182.7 | 83.6 | 1.911 | 6.61 |
| 214 | 3 | 3.5 | 14.0 | 8.04 | 2 | 169.9 | 83.6 | 1.880 | 7.50 |
| 214 | 3 | 3.5 | 14.0 | 8.04 | 2 | 176.3 | 83.6 | 1.937 | 6.99 |
| 214 | 3 | 4.5 | 18.0 | 7.89 | 2 | 196.1 | 83.3 | 2.437 | 5.70 |
| 214 | 3 | 4.5 | 18.0 | 7.89 | 2 | 180.7 | 83.3 | 2.402 | 6.53 |
| 214 | 3 | 4.5 | 18.0 | 7.89 | 2 | 188.4 | 83.3 | 2.473 | 6.06 |
| 214 | 3 | 4.5 | 18.0 | 7.89 | 2 | 197.2 | 83.5 | 2.435 | 5.66 |
| 214 | 3 | 4.5 | 18.0 | 7.89 | 2 | 181.9 | 83.5 | 2.400 | 6.46 |
| 214 | 3 | 4.5 | 18.0 | 7.89 | 2 | 189.6 | 83.5 | 2.471 | 6.00 |
| 214 | 3 | 4.5 | 18.0 | 7.89 | 2 | 197.1 | 61.4 | 2.469 | 4.78 |
| 214 | 3 | 4.5 | 18.0 | 7.89 | 2 | 182.2 | 61.4 | 2.433 | 5.31 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 214 | 3 | 4.5 | 18.0 | 7.89 | 2 | 189.6 | 61.4 | 2.505 | 5.00 |
| 214 | 3 | 5.5 | 22.0 | 7.62 | 2 | 211.0 | 81.7 | 2.955 | 4.82 |
| 214 | 3 | 5.5 | 22.0 | 7.62 | 2 | 194.9 | 81.7 | 2.913 | 5.44 |
| 214 | 3 | 5.5 | 22.0 | 7.62 | 2 | 203.0 | 81.7 | 2.999 | 5.08 |
| 214 | 3 | 5.5 | 22.0 | 7.62 | 2 | 210.4 | 81.9 | 2.956 | 4.85 |
| 214 | 3 | 5.5 | 22.0 | 7.62 | 2 | 194.0 | 81.9 | 2.914 | 5.49 |
| 214 | 3 | 5.5 | 22.0 | 7.62 | 2 | 202.2 | 81.9 | 3.000 | 5.12 |
| 214 | 3 | 5.5 | 22.0 | 7.62 | 2 | 211.9 | 81.9 | 2.953 | 4.79 |
| 214 | 3 | 5.5 | 22.0 | 7.62 | 2 | 195.0 | 81.9 | 2.913 | 5.44 |
| 214 | 3 | 5.5 | 22.0 | 7.62 | 2 | 203.5 | 81.9 | 2.997 | 5.07 |
| 214 | 3 | 5.5 | 22.0 | 7.62 | 2 | 212.1 | 81.9 | 2.953 | 4.78 |
| 214 | 3 | 5.5 | 22.0 | 7.62 | 2 | 195.6 | 81.9 | 2.912 | 5.41 |
| 214 | 3 | 5.5 | 22.0 | 7.62 | 2 | 203.8 | 81.9 | 2.997 | 5.06 |
| 215 | 3 | 5.5 | 22.0 | 6.48 | 2 | 211.0 | 81.7 | 2.955 | 4.09 |
| 215 | 3 | 5.5 | 22.0 | 6.48 | 2 | 194.9 | 81.7 | 2.913 | 4.62 |
| 215 | 3 | 5.5 | 22.0 | 6.48 | 2 | 203.0 | 81.7 | 2.999 | 4.32 |
| 215 | 3 | 5.5 | 22.0 | 6.48 | 2 | 210.4 | 81.9 | 2.956 | 4.12 |
| 215 | 3 | 5.5 | 22.0 | 6.48 | 2 | 194.0 | 81.9 | 2.914 | 4.66 |
| 215 | 3 | 5.5 | 22.0 | 6.48 | 2 | 202.2 | 81.9 | 3.000 | 4.35 |
| 215 | 3 | 5.5 | 22.0 | 6.48 | 2 | 211.9 | 81.9 | 2.953 | 4.07 |
| 215 | 3 | 5.5 | 22.0 | 6.48 | 2 | 195.0 | 81.9 | 2.913 | 4.63 |
| 215 | 3 | 5.5 | 22.0 | 6.48 | 2 | 203.5 | 81.9 | 2.997 | 4.31 |
| 215 | 3 | 5.5 | 22.0 | 6.48 | 2 | 212.1 | 81.9 | 2.953 | 4.07 |
| 215 | 3 | 5.5 | 22.0 | 6.48 | 2 | 195.6 | 81.9 | 2.912 | 4.60 |
| 215 | 3 | 5.5 | 22.0 | 6.48 | 2 | 203.8 | 81.9 | 2.997 | 4.30 |
| 216 | 3 | 1.0 | 4.0 | 12.57 | 2 | 130.0 | 85.4 | .563 | 22.79 |
| 216 | 3 | 1.0 | 4.0 | 12.57 | 2 | 125.9 | 85.4 | .551 | 24.82 |
| 216 | 3 | 1.0 | 4.0 | 12.57 | 2 | 127.9 | 85.4 | .570 | 23.65 |
| 216 | 3 | 1.0 | 4.0 | 12.57 | 2 | 128.7 | 85.4 | .564 | 23.51 |
| 216 | 3 | 1.0 | 4.0 | 12.57 | 2 | 126.1 | 85.4 | .551 | 24.70 |
| 216 | 3 | 1.0 | 4.0 | 12.57 | 2 | 127.4 | 85.4 | .570 | 23.98 |
| 216 | 3 | 1.0 | 4.0 | 12.57 | 2 | 129.1 | 85.2 | .564 | 23.18 |
| 216 | 3 | 1.0 | 4.0 | 12.57 | 2 | 126.5 | 85.2 | .551 | 24.35 |
| 216 | 3 | 1.0 | 4.0 | 12.57 | 2 | 127.8 | 85.2 | .570 | 23.64 |
| 216 | 3 | 1.5 | 6.0 | 12.72 | 2 | 146.1 | 86.2 | .836 | 17.21 |
| 216 | 3 | 1.5 | 6.0 | 12.72 | 2 | 138.9 | 86.2 | .820 | 19.33 |
| 216 | 3 | 1.5 | 6.0 | 12.72 | 2 | 142.5 | 86.2 | .846 | 18.12 |
| 216 | 3 | 1.5 | 6.0 | 12.72 | 2 | 146.6 | 86.2 | .836 | 17.07 |
| 216 | 3 | 1.5 | 6.0 | 12.72 | 2 | 139.2 | 86.2 | .820 | 19.25 |
| 216 | 3 | 1.5 | 6.0 | 12.72 | 2 | 142.9 | 86.2 | .846 | 18.01 |
| 216 | 3 | 1.5 | 6.0 | 12.72 | 2 | 147.2 | 86.4 | .836 | 16.95 |
| 216 | 3 | 1.5 | 6.0 | 12.72 | 2 | 139.5 | 86.4 | .820 | 19.18 |
| 216 | 3 | 1.5 | 6.0 | 12.72 | 2 | 143.3 | 86.4 | .846 | 17.91 |
| 216 | 3 | 2.0 | 8.0 | 10.79 | 2 | 156.2 | 86.2 | 1.108 | 12.50 |
| 216 | 3 | 2.0 | 8.0 | 10.79 | 2 | 147.4 | 86.2 | 1.088 | 14.12 |
| 216 | 3 | 2.0 | 8.0 | 10.79 | 2 | 151.8 | 86.2 | 1.122 | 13.20 |
| 216 | 3 | 2.0 | 8.0 | 10.79 | 2 | 156.7 | 86.5 | 1.107 | 12.46 |
| 216 | 3 | 2.0 | 8.0 | 10.79 | 2 | 144.5 | 86.5 | 1.090 | 14.91 |
| 216 | 3 | 2.0 | 8.0 | 10.79 | 2 | 150.6 | 86.5 | 1.123 | 13.51 |

| RUN | NO OF PEL | ETHYL ENE CC/SC | HYDRO GEN CC/SC | CON VER SION | THERM OCOU- PLE | SURFACE TEMP F | BULK TEMP F | REYNOLDS NUMBER | J FACTOR |
|---|---|---|---|---|---|---|---|---|---|
| 216 | 3 | 2.0 | 8.0 | 10.79 | 2 | 156.4 | 86.6 | 1.108 | 12.54 |
| 216 | 3 | 2.0 | 8.0 | 10.79 | 2 | 147.7 | 86.6 | 1.087 | 14.16 |
| 216 | 3 | 2.0 | 8.0 | 10.79 | 2 | 152.0 | 86.6 | 1.122 | 13.24 |
| 216 | 3 | 2.5 | 10.0 | 9.96 | 2 | 165.9 | 84.4 | 1.378 | 9.93 |
| 216 | 3 | 2.5 | 10.0 | 9.96 | 2 | 155.5 | 84.4 | 1.354 | 11.24 |
| 216 | 3 | 2.5 | 10.0 | 9.96 | 2 | 160.7 | 84.4 | 1.396 | 10.50 |
| 216 | 3 | 2.5 | 10.0 | 9.96 | 2 | 166.1 | 84.5 | 1.378 | 9.92 |
| 216 | 3 | 2.5 | 10.0 | 9.96 | 2 | 155.6 | 84.5 | 1.354 | 11.25 |
| 216 | 3 | 2.5 | 10.0 | 9.96 | 2 | 160.8 | 84.5 | 1.396 | 10.49 |
| 216 | 3 | 2.5 | 10.0 | 9.96 | 2 | 166.2 | 84.2 | 1.378 | 9.87 |
| 216 | 3 | 2.5 | 10.0 | 9.96 | 2 | 155.9 | 84.2 | 1.354 | 11.16 |
| 216 | 3 | 2.5 | 10.0 | 9.96 | 2 | 161.1 | 84.2 | 1.396 | 10.42 |
| 216 | 3 | 3.5 | 14.0 | 8.61 | 2 | 179.4 | 83.6 | 1.915 | 7.32 |
| 216 | 3 | 3.5 | 14.0 | 8.61 | 2 | 166.8 | 83.6 | 1.884 | 8.33 |
| 216 | 3 | 3.5 | 14.0 | 8.61 | 2 | 173.1 | 83.6 | 1.941 | 7.75 |
| 216 | 3 | 3.5 | 14.0 | 8.61 | 2 | 179.5 | 83.6 | 1.914 | 7.31 |
| 216 | 3 | 3.5 | 14.0 | 8.61 | 2 | 166.9 | 83.6 | 1.884 | 8.32 |
| 216 | 3 | 3.5 | 14.0 | 8.61 | 2 | 173.2 | 83.6 | 1.941 | 7.74 |
| 216 | 3 | 3.5 | 14.0 | 8.61 | 2 | 182.7 | 83.6 | 1.911 | 7.08 |
| 216 | 3 | 3.5 | 14.0 | 8.61 | 2 | 169.9 | 83.6 | 1.880 | 8.03 |
| 216 | 3 | 3.5 | 14.0 | 8.61 | 2 | 176.3 | 83.6 | 1.937 | 7.49 |
| 216 | 3 | 4.5 | 18.0 | 7.38 | 2 | 196.1 | 83.3 | 2.437 | 5.33 |
| 216 | 3 | 4.5 | 18.0 | 7.38 | 2 | 180.7 | 83.3 | 2.402 | 6.10 |
| 216 | 3 | 4.5 | 18.0 | 7.38 | 2 | 188.4 | 83.3 | 2.473 | 5.66 |
| 216 | 3 | 4.5 | 18.0 | 7.38 | 2 | 197.2 | 83.5 | 2.435 | 5.29 |
| 216 | 3 | 4.5 | 18.0 | 7.38 | 2 | 181.9 | 83.5 | 2.400 | 6.04 |
| 216 | 3 | 4.5 | 18.0 | 7.38 | 2 | 189.6 | 83.5 | 2.471 | 5.61 |
| 216 | 3 | 4.5 | 18.0 | 7.38 | 2 | 197.1 | 61.4 | 2.469 | 4.47 |
| 216 | 3 | 4.5 | 18.0 | 7.38 | 2 | 182.2 | 61.4 | 2.433 | 4.96 |
| 216 | 3 | 4.5 | 18.0 | 7.38 | 2 | 189.6 | 61.4 | 2.505 | 4.68 |
| 216 | 3 | 5.5 | 22.0 | 7.00 | 2 | 211.0 | 81.7 | 2.955 | 4.42 |
| 216 | 3 | 5.5 | 22.0 | 7.00 | 2 | 194.9 | 81.7 | 2.913 | 4.99 |
| 216 | 3 | 5.5 | 22.0 | 7.00 | 2 | 203.0 | 81.7 | 2.999 | 4.67 |
| 216 | 3 | 5.5 | 22.0 | 7.00 | 2 | 210.4 | 81.9 | 2.956 | 4.45 |
| 216 | 3 | 5.5 | 22.0 | 7.00 | 2 | 194.0 | 81.9 | 2.914 | 5.04 |
| 216 | 3 | 5.5 | 22.0 | 7.00 | 2 | 202.2 | 81.9 | 3.000 | 4.70 |
| 216 | 3 | 5.5 | 22.0 | 7.00 | 2 | 211.9 | 81.9 | 2.953 | 4.40 |
| 216 | 3 | 5.5 | 22.0 | 7.00 | 2 | 195.0 | 81.9 | 2.913 | 5.00 |
| 216 | 3 | 5.5 | 22.0 | 7.00 | 2 | 203.5 | 81.9 | 2.997 | 4.66 |
| 216 | 3 | 5.5 | 22.0 | 7.00 | 2 | 212.1 | 81.9 | 2.953 | 4.39 |
| 216 | 3 | 5.5 | 22.0 | 7.00 | 2 | 195.6 | 81.9 | 2.912 | 4.97 |
| 216 | 3 | 5.5 | 22.0 | 7.00 | 2 | 203.8 | 81.9 | 2.997 | 4.64 |

# APPENDIX E

## CONDUCTIVE AND RADIANT HEAT TRANSFER

## APPENDIX E

## CONDUCTIVE AND RADIANT HEAT TRANSFER

The calculations below show that conductive and radiant heat transfer were negligible in this study. The surface temperature was 357°F.; the bulk gas temperature was 208°F.; and the heat transfer rate was 32.7 Btu/hr.

1. Conductive heat transfer (41).

$Q_c = kA(\Delta T/\Delta X)$

$k = 0.03$ Btu/(hr.-sq. ft.-(°F/ft.))

$A = (7 \text{ particles})(0.000510 \text{ sq. ft./particle}) = 0.00357$ sq.ft.

$\Delta T = 357°F. - 208°F. = 149°F.$

$\Delta X = (0.50)(3.4 \text{ cm.})(\text{in.}/2.54 \text{ cm.})(\text{ft.}/12 \text{ in.}) = 0.0556$ ft.

$Q_c = (0.03)(0.00357)(149)/(0.0556) = 0.287$ Btu./hr.

2. Radiant heat transfer (20).

$Q_r = \sigma AC(T_1^4 - T_2^4)$

$\epsilon = 1/((1/\epsilon_1) + (1/\epsilon_2) - 1.0)$ $\quad \epsilon_1 = 0.96$

$\epsilon_2 = 0.85$

$\epsilon = 0.821$

$T_1 = 357°F. = 817°R.$

$T_2 = 208°F. = 668°R.$

$\sigma = 1.73 \times 10^{-9}$ Btu./(hr.-sq. ft.-°$R^4$)

$Q_r = 0.118$ Btu./hr.

3. Total heat loss from radiation and conduction.

$Q_t = Q_c + Q_r$

$Q_t = 0.287 + 0.118 = 0.405$ Btu./hr.

Percent of total = (0.405/32.7)(100) = 1.24%

# APPENDIX F

## INFLUENCE OF PARTICLE ORIENTATION UPON SURFACE TEMPERATURE

## APPENDIX F

### INFLUENCE OF PARTICLE ORIENTATION UPON SURFACE TEMPERATURE

It was noted that there was a dependence of catalyst surface temperature upon catalyst particle orientation. The particles which were oriented with the major axis of the cylinder parallel to the direction of flow consistently had a higher surface temperature than those particles which were oriented with their major axis perpendicular to the flow.

Since these particles would not have generated the same amount of heat because the surface temperatures were different, the following procedure was used to calculate the heat evolved by a particle:

1. The arithmetic average surface temperature was calculated for all catalyst particles.
2. The heat of reaction was calculated at that temperature.
3. An average amount of heat evolved per particle was calculated by dividing the heat production rate by the number of catalyst particles in the packed bed.
4. The amount of heat evolved by any particle was calculated as the product of the heat rate calculated in (3) above and the ratio of the temperature drop of that particle to the average temperature drop.

Although the above procedure was used to calculate the heat evolved per particle, the j-factors for the particles with their major axis parallel to the direction of flow were consistently

lower than those with their major axis perpendicular to the direction of flow.

This made the constant, a, in the equation, $j_h = aN_{Re}^{b}$, consistently lower for those particles with their major axes parallel than those with their major axes perpendicular to the direction of flow. These results are shown below:

| Orientation of Axis to Flow | a (in $j_h = aN_{Re}^{b}$) |
|---|---|
| Parallel | 11.2 |
| | 11.7 |
| | 11.6 |
| | 12.0 |
| | 11.1 |
| | 11.5 |
| | 12.5 |
| | 12.5 |
| | 13.5 |
| Perpendicular | 15.3 |
| | 19.1 |
| | 15.9 |
| | 22.9 |
| | 15.1 |
| | 18.2 |
| | 14.1 |
| | 14.2 |
| | 14.8 |

VITA

John Early Klopp

Candidate for the Degree of

Master of Science

Thesis: HEAT TRANSFER IN A PACKED BED REACTOR AT LOW REYNOLDS NUMBER: THE HYDROGENATION OF ETHYLENE TO ETHANE ON NICKEL CYLINDERS

Major Field: Chemical Engineering

Biographical:

Personal Data: Born in San Antonio, Texas, November 10, 1940, the son of G. Kirt and Alberta E. Klopp.

Education: Attended grade school in Erlanger and South Fort Mitchell, Kentucky; graduated from Beechwood High School, South Fort Mitchell, in 1958; attended the University of Kentucky, Lexington, for one year; received the Bachelor of Science degree from the Oklahoma State University in August, 1963; completed the requirements for the Master of Science degree in May, 1965.

Professional Experience: Worked as a Summer Management Trainee for the Procter and Gamble Manufacturing Company, Dallas, Texas, in 1963.

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