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Comparison of Temperatures of Flames on Porous Burners

IN A recent communication[1], W. E. KASKAN has compared maximum temperatures for lean, flat hydrogen–air flames on porous burners obtained by measurement with coated thermocouples with temperatures for corresponding flames deduced from the heat loss data of D. B. SPALDING and V. S. YUMLU[2]. Kaskan found that temperatures based on the data of Spalding and Yumlu were several hundred degrees higher than those obtained with his coated thermocouples, but could not account for the difference in terms of reasonable sources of heat loss.

We have used the heat abstraction method to deduce flame temperatures based on the upstream heat loss from a flame to water flowing through a coil sintered to the base of a porous copper burner 4 in. in diameter and $\frac{5}{16}$ in. thick. As a precaution before applying these temperatures, we compared them with thermocouple temperatures previously reported by W. E. KASKAN[3,4]. As shown by the examples given in *Table 1*, the correspondence is fairly good. The differences are always less than 100°K, and a reasonable allowance for the small differences in initial conditions shows that the thermocouple temperatures are usually higher.

These results suggest that in the method used by Spalding and Yumlu to determine the heat loss a significant part of the heat loss was not measured. Apparently, if the heat abstraction rate is measured with sufficient accuracy, valid temperatures can be obtained.

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Table 1. Comparison of flame temperatures obtained by thermocouple and heat abstraction methods for closely corresponding initial conditions

Pressure atm	*Equiv. ratio*	*Stream velocity of unburnt gas*	*Temp. °K*	*Source*
		Heat abstraction		
1	0·80	30	1645	*This work*
1	0·80	45	1690	
0·41	0·70	13·5	1377	
0·41	0·70	30	1513	
0·25	0·50	25	1447	
		Thermocouple		
1	0·80	30	1695	Ref. 3
1	0·80	45	1780	Ref. 3
0·45	0·80	13·6	1435	Ref. 4
0·45	0·60	31·1	1560	Ref. 4
0·45	0·50	20·6	1410	Ref. 4

References

1 KASKAN, W. E. *Combustion & Flame*, 1960, **4**, 285
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3 KASKAN, W. E. *Sixth Symposium (International) on Combustion*, p 134. Reinhold: New York, 1957
4 KASKAN, W. E. *Combustion & Flame*, 1958, **2**, 229

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