

the sensitized solutions (Table 2). For  $10^{-2}$  and  $10^{-3}M$  acetone in 5 and 1% glucose solution, the plot of OD vs time of photolysis is linear for 5-30 min of photolysis. But for  $10^{-1}M$  sensitizer concentration, it is linear only upto 15 min of photolysis. There is considerable increase in the quantum yield of MA when glucose solution is photolysed using the sensitizer. For hundred-fold decrease in the sensitizer concentration there is only about 50% change in MA quantum yield.

The results show that acetone sensitized photolysis of glucose solution can be used as an actinometer for short irradiation times whereas unsensitized glucose and sucrose solution can be used for long irradiation times. Malonaldehyde formation from

the photolysis of glucose and sucrose solution can be used as a chemical actinometer for  $14.4 \times 10^{19}$  quanta to  $25.9 \times 10^{20}$  quanta of light in the 200-300 nm range.

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### Effect of Surfactants on the Fluorescence Intensity of 9,10-Diphenylanthracene

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The effect of some nonionic, cationic and anionic surfactants on the fluorescence intensity of 9,10-diphenylanthracene has been studied. It has been found that there is a marked enhancement in the fluorescence intensity on adding the surfactants. The effect of varying ethanol concentration is also studied.

PADHYE and Padhye<sup>1</sup> have found that some non-ionic and anionic surfactants increase the fluorescence intensity of optical brightening agents. Ghosh<sup>2</sup> has studied the effect of sodium lauryl sulphate on absorption spectrum and fluorescence intensity of methylene blue. Similarly Harada and Tōya<sup>3</sup> have reported that fluorescence intensity of certain dyes are influenced by the addition of long chain fatty acids and esters.

We wish to report in this note the results of preliminary investigation on the effect of some anionic, viz. dodecylbenzene sodium sulphonate (DBSS) and dioctyl sodium sulphosuccinate (DSSS); non-ionic, viz. Triton X-100 (T<sub>x</sub>-100), polyoxyethylene 23-laurylsulphate (Brij-35) and polyoxyethylene mono-o'ate (Tween-80) and cationic, viz. cetyltrimethylammonium bromide (CTAB) surfactants on the fluorescence intensity of 9,10-diphenylanthracene (9,10-DPA). Notable increase in fluorescence intensity occurs for all the surfactants, specially on the addition of some non-ionic surfactants (Table 1). However, increase in fluorescence intensity also occurs on increasing ethanol concentration in the absence of surfactants. Further the fluorescence intensity reaches a maximum at 50% ethanol concentration (Table 2). Observations in total absence of ethanol could not be made due to the insolubility of 9,10-DPA in pure water. Further work is in progress.

At the moment it is difficult to give a theoretical explanation for the enhancement in fluorescence. It is likely that micelle formation is occurring in solution resulting in enhancement of fluorescence, since a limiting value is being approached in all the cases.

Carl-Zeiss spectrophotometer "SPEKOL" with fluorescence attachment was used for fluorescence studies in which a mercury lamp was employed as the light source. Appropriate filters were used for

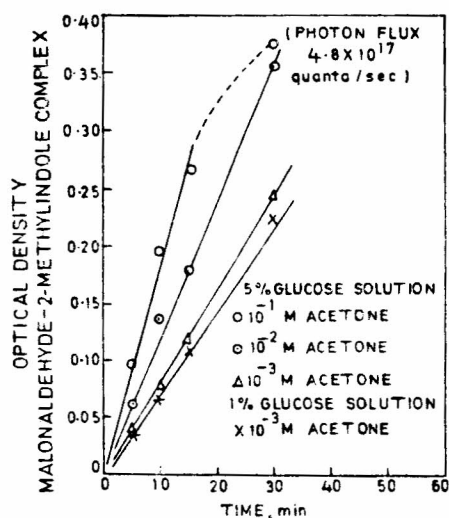


Fig. 2—Plot of optical density versus time of photolysis in the acetone-sensitized photolysis of glucose and sucrose solutions

TABLE 1 — YIELD OF MALONALDEHYDE WITH GLUCOSE AND SUCROSE SOLUTION

	Quantum yield of malonaldehyde $\times 10^3$ after photolysis for			
	15 min	30 min	1 hr	1½ hr
Glucose				
5% solution	0.32	0.34	0.33	0.32
1% solution	0.27	0.23	0.25	0.27
Sucrose				
5% solution	0.23	0.27	0.24	0.26

TABLE 2 — YIELD OF MALONALDEHYDE WITH VARYING SENSITIZER CONCENTRATION AND VARYING GLUCOSE CONCENTRATION

	Quantum yield of malonaldehyde $\times 10^2$ after photolysis for			
	5 min	10 min	15 min	30 min
Glucose (5%) + acetone				
$10^{-1}M$	0.33	0.34	0.30	0.21
$10^{-2}M$	0.21	0.23	0.21	0.20
$10^{-3}M$	0.12	0.13	0.14	0.14
Glucose 1% + acetone $10^{-3}M$	0.097	0.11	0.12	0.13

TABLE 1 — VARIATION OF FLUORESCENCE INTENSITY WITH THE CONCENTRATION OF SURFACTANTS IN 20% ETHANOL

 $[\lambda_{\text{ex}} = 365 \text{ nm}; \lambda_{\text{em}} = 400 \text{ nm}; \text{FI} = \text{fluorescence intensity}]$ 

% DBSS	FI	% DSSS	FI	% T <sub>x</sub> -100	FI	% Brij-35	FI	% Tween-80	FI	% CTAB	FI
0.00	4	0.00	4	0.000	4	0.000	4	0.000	4	0.00	4
0.05	7	0.05	3	0.005	6	0.005	3	0.001	7	0.01	4
0.08	16	0.10	6	0.010	7	0.010	5	0.002	13	0.02	5
0.10	26	0.20	14	0.020	14	0.020	14	0.003	18	0.03	7
0.15	45	0.25	20	0.030	34	0.025	19	0.004	24	0.04	14
0.20	62	0.30	26	0.035	47	0.030	29	0.005	30	0.05	25
0.25	70	0.35	32	0.040	55	0.035	26	0.006	37	0.06	39
0.30	74	0.40	38	0.045	62	0.040	21	0.008	46	0.07	56
0.35	77	0.50	46	0.050	67	0.045	32	0.010	53	0.08	64
0.40	78	0.60	53	0.060	76	0.050	54	0.014	62	0.09	66
0.50	78	0.70	61	0.080	84	0.060	74	0.018	67	0.10	69
0.60	79	0.80	63	0.100	86	0.080	77	0.050	73	0.12	73
—	—	—	—	0.200	88	0.100	79	0.100	78	0.14	74
—	—	—	—	0.300	88	0.200	79	0.150	80	0.16	75

TABLE 2 — VARIATION OF FLUORESCENCE INTENSITY WITH CHANGING ETHANOL CONCENTRATION

 $[9,10\text{-DPA} = 10^{-5}M; \lambda_{\text{ex}} = 365 \text{ nm}; \lambda_{\text{em}} = 400 \text{ nm}]$ 

% ethanol	Fluorescence intensity	% ethanol	Fluorescence intensity
10	3	60	120
20	4	70	116
30	14	80	112
40	85	90	106
50	124	100	100

measuring fluorescence intensity, at different wavelengths. The emission spectra were taken on Aminco-Bowman spectrofluorimeter.

After examining the fluorescence excitation spectrum, 365 nm was chosen as the excitation wavelength. The fluorescence emission was measured at 400 nm.

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### Micellization of Cobalt Hexamine Soaps in Methanol-Benzene Mixture

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Cobalt hexamine laurate, myristate, palmitate and stearate have been prepared and their micellization in methanol-benzene mixtures has been studied by conductance and absorbance methods. The c.m.c. values determined by the two methods are in good agreement. It is found that the c.m.c. values of soaps increase from stearate to laurate in methanol-benzene mixtures. The c.m.c. values of the soaps decrease with the decreasing amount of methanol in the mixture.

HEAVY metal ions like Cu(II), Co(II) and Ni(II) etc. interact with sodium salts of higher fatty acids to give heavy metal soaps which form micelles<sup>1</sup> in non-aqueous medium and are used as catalysts, additives in lubricating preparations etc. These metal soaps are sparingly soluble in non-aqueous media. It was thought worthwhile to prepare modified metal soaps such as cobalt hexamine soap which may have higher solubility in non-aqueous media. The higher solubility might significantly affect the role of metal soaps in lubricating preparations. These modified soaps have been designated as metal complex soaps. No data are available on the solubility and micellar behaviour of these soaps in solution. It is observed that the cobalt complex soap is relatively more soluble than the corresponding cobalt soap.

Sodium laurate, myristate, palmitate and stearate were of reagent grade (BDH) and were used as such. All other reagents and solvents were of AR grade. Hexamine cobalt(III) chloride was prepared by the literature method<sup>2</sup>. Cobalt myristate was also prepared by the literature method<sup>3</sup>.

**Preparation of cobalt hexamine soaps** — The cobalt hexamine laurate, myristate, palmitate and stearate were prepared by interacting aqueous solution (0.01M) of respective sodium soaps with aqueous

TABLE 1 — ANALYTICAL DATA ON THE COBALT HEXAMINE SOAPS

Soap	N (%)*	
	Calc.	Found
Cobalt hexamine laurate, $\text{Co}(\text{NH}_3)_6(\text{C}_{11}\text{H}_{23}\text{COO})_3$	11.09	10.68
Cobalt hexamine myristate, $\text{Co}(\text{NH}_3)_6(\text{C}_{13}\text{H}_{27}\text{COO})_3$	9.98	9.55
Cobalt hexamine palmitate, $\text{Co}(\text{NH}_3)_6(\text{C}_{15}\text{H}_{31}\text{COO})_3$	9.13	8.34
Cobalt hexamine stearate, $\text{Co}(\text{NH}_3)_6(\text{C}_{17}\text{H}_{35}\text{COO})_3$	8.32	8.59

\*Satisfactory C, H analyses have been obtained for all the soaps.