It is seen (Table I) that on increasing the concentration from $7{\cdot}5 \times 10^{-8}$ g/cc to $7{\cdot}5 \times 10^{-6}$ g/cc, the emission peak remains constant at 538 nm but the peak position changes to 560 nm as the concentration is further increased to $1{\cdot}5 \times 10^{-4}$ g/cc. Thus it is seen that the emission peak shows a red shift. From Table I, we can easily infer that (1) the emission wavelength is almost constant over the concentration range $\sim 10^{-8}$ to $\sim 10^{-6}$ g/cc. (2) There is a sharp break in the constant nature of the wavelength at around $\sim 10^{-5}$ g/cc and (3) For further increase in concentration upto $\sim 10^{-4}$ g/cc and the emission wavelength increases linearly. The break in the linear nature around concentration $\sim 10^{-5}$ g/cc can be explained as follows:

Mercurochrom in solution, like fluorescein[1-8] can exist as neutral molecules, mono or dianions, dimers of neutral molecules or of dianions or even polymers. The break in the constant nature of the graph suggests that around this concentration ($\sim 10^{-5}$ g/cc), a change in the molecular form of the dye takes place, *e.g.*, from monomeric to possibly dimeric or even polymeric at higher concentrations. Though there is a possibility of these two varieties existing simultaneously in this investigation, we find only one emission peak and not two for each concentration. This shows that at very low concentrations, the emission is mainly due to the monomeric species while at high concentrations, possibly the dimers are formed and the large change in the emission wavelength is due to this variety.

The excitation peak for maximum emission intensity also shows a similar red shift with increasing concentration. In this case also the discontinuity occurs around concentration $\sim 10^{-5}$ g/cc. This behaviour is similar to that of emission spectra as detailed above.

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SOLAR ABSORPTANCE PROPERTIES OF SOME NONSELECTIVE COATINGS

AN ideal solar absorptance coating should have maximum absorptance ($\alpha = 1$) over the solar spectrum region ($0{\cdot}25$–$2{\cdot}5\ \mu$m) and minimum emittance ($\epsilon = 0$) in the infrared region ($2{\cdot}5$–$30\ \mu$m). The spectral reflectance measurements were carried out on some of the Indian paints in the visible and infrared region to asses their performance characteristics.

Three Indian paints, *viz.*, black-board paint (commercial sample A), black paint (commercial sample B) and black enamel paint (commercial sample C) were sprayed on 50 mm × 50 mm × 3 mm thick aluminium substrates to a thickness of few microns. The substrates were cleaned with dilute KOH and rinsed with water and dried before the paint was sprayed. The coatings were allowed to dry at room temperature for more than 6 hours and some were dried at 100° C for a few hours.

The spectral reflectance measurements were carried on a reflectometer constructed in this laboratory in the visible region and Carl Zeiss UR–10 Spectrophotometer for infrared region at an incidence angle of 15°. The reflectance percentage *versus* wavelength between $0{\cdot}45$–$16\ \mu$m for the three paints are given in Fig. 1.

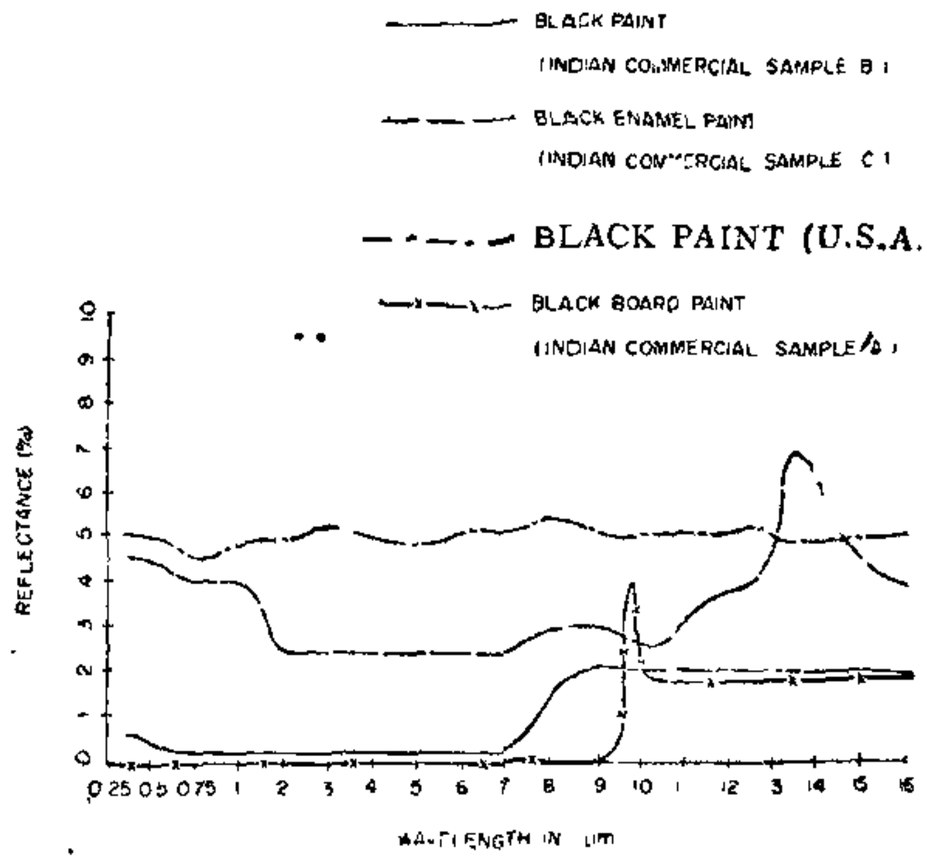

FIG. 1. Spectral reflectance for various paints.

A black paint (U.S.A.) which is specifically made for the application in their solar collector systems production, reflectance curve is also given for comparison[1]. Black-board paint (sample A) gives zero reflectance from $0{\cdot}45$ to $9\ \mu$m and then sharply rises to $R = 4{\cdot}5\%$ in a narrow region and gives $R = 2\%$ in infrared region. The black paint (sample B) also gives low reflectance in the solar spectrum. However the behaviour of the black enamel coating (sample C) curve shows higher reflectances in visible and infrared region compared with the other two paints. Black paint (U.S.A.) gives uniformly 5% reflectance in both solar spectrum and infrared region. The black-board paint (sample A) could be graded as most efficient absorbing coating for

low thermal solar collectors as it gives zero reflectance in solar spectral region.

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LOW ENERGY PHOTON ATTENUATION COEFFICIENTS

MEASUREMENTS on total photon attenuation coefficients at low energies are of interest because of their high dependence on energy. Most of the available measurements are carried out either with NaI (Tl) detectors or crystal diffraction gratings. In view of the resolution and energy spread difficulties respectively of the above two systems, it is desirable to undertake measurements on total attenuation coefficients either with Si (Li) detector or a proportional counter. Such measurements are very scarce. Moreover, at these energies the most dominant partial effect is the atomic photoeffect. Recently, very accurate theoretical photoelectric cross-sections are reported by Scofield[1]. Hence, it is of interest to make a systematic measurement of the total photon attenuation cross-sections at low-energies.

A small good-geometry arrangement of the Davisson Evans type with graded shields is developed in this department for use with sources of small intensity. The detector is a krypton-filled proportional counter supplied by ECIL, Hyderabad. A Co^{57} source, which emits 6·4 keV K X-rays and 14·4 keV gamma-rays, is used for the present measurements. Transmission measurements are carried out in thin foils of Cu, Mo, Au and Pb employing the usual procedures[2,3]. The cross-section is calculated using the expression

$$N = N_0 e^{-\mu t}$$

where the symbols have their usual meaning. Thin foils of different thicknesses were employed. The average values are adapted. The measured total photon attenuation cross-sections are presented in Table I. From these values the theoretical coherent and incoherent scattering cross-sections of Storm and Isreal[4], (in no case exceeding 5% of the total) are substracted. The resultant photo-electric cross sections are compared with the latest theoretical values of Scofiled[1] in the same table. The errors in the experimental values are of the order of 2%. It can be seen from Table I that there is satisfactory agreeement between theory and experiment within 3%.

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TABLE I

Cross-sections (in barns/atom)

Energy (keV)	Element	Cu	Mo	Gold	Lead
6·4	Exp. Total:	10,430 ± 2%	48,175 ± 2%		
	Exp. Photo:	10,150 ± 2%	47,640 ± 2%		
	Th.:	10,400	47,000		
14·4	Exp. Total	..	61,505 ± 2%	45,251 ± 2%	
	Exp. Photo	..	59,220 ± 2%	43,152 ± 2%	
	Th.		57,801	42,403	

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FRANCK-CONDON FACTORS AND *r*-CENTROIDS TO HIGH QUANTUM NUMBERS FOR THE ($A^2\Sigma^+$–$X^2\Sigma^+$) TRANSITION OF AlO

IN the (A–X) transition of AlO, bands with v' and v'' up to 22 have been reported[1]. Franck-Condon (FC) factors and *r*-centroids for this transition, using approximate Morse and less appropriate RKR potential are available[2,3], only for low vibrational quantum numbers. We are reporting here the results of our investigations on these parameters, for the above transition up to high vibrational quantum numbers *viz.*, $v' = 21$ and $v'' = 22$, using wavefunctions,