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May 30, 1966.

1. Pauling, L., *The Nature of the Chemical Bond*, 3rd edition, Cornell University Press, Ithaca, New York, 1960.
2. Brockway, L. O., *J. Phys. Chem.*, 1937, **41**, 185.
3. Chandra, S. and Chandra, S. (Communicated).
4. Wilmshurst, J. K., *J. Chem. Phys.*, 1957, **27**, 1129.
5. Goldstein, J. H., *Ibid.*, 1956, **24**, 106.
6. Howe, J. A. and Goldstein, J. H., *Ibid.*, 1956, **27**, 831.
7. Sinott, K. M., *Ibid.*, 1961, **34**, 851.
8. Krisher, L. C., *Ibid.*, 1960, **33**, 1237.

NEAR ULTRAVIOLET EMISSION SPECTRUM OF 1-2 FLUOROTOLUENE VAPOUR

THE spectroscopic studies of 1-2-fluorotoluene molecule have been made by various workers in optical and infrared regions.¹⁻⁵ In order to fix the ground state vibration frequencies a detailed study of the emission spectrum of 1-2-fluorotoluene was undertaken.

The emission spectrum was obtained in an uncondensed transformer discharge through the flowing vapour of the substance. The spectrum was photographed on Hilger medium quartz spectrograph with a slit width of 25 μ and a dispersion of about 11 $\text{\AA}/\text{mm}$. at 2600 \AA . Kodak II-O plates were used for photographing the spectrum with an exposure time of 15 to 20 hours.

About twenty bands could be recorded in the region 37010-37625 cm^{-1} . The (0, 0) band has been identified at 37560 cm^{-1} which is faint in intensity (due to self-absorption by the cold vapour near the observational window). It may be mentioned that in the near ultraviolet absorption spectrum of 1-2-fluorotoluene in the vapour phase Joshi³ has reported the (0, 0) band at 37567 cm^{-1} which is very strong.

TABLE I

Raman (Liquid)		Infrared (Liquid)	Emission (vapour) (cm^{-1})	Assignment
Thompson and Temple ⁴ (cm^{-1})	Deb ⁵ (cm^{-1})	Thompson and Temple ⁴ (cm^{-1})		
185 (6) D	190 (6b)	..	150 m	a''
			200 m	a''
275 (5) D	272 (6b)	..	270 m	a''
			367 w	a''
526 (5) D	526 (3b)	528 s	532 ms	a'

D = Depolarised, b = Broad, s = Strong, ms = Medium strong, m = Medium, w = Weak. The number in brackets represent relative intensity.

The molecule 1-2-fluorotoluene ($\text{FC}_6\text{H}_4\text{CH}_3$) may belong to Cs point group having only one

element of symmetry, namely, the plane of the molecule, if we assume that 'CH₃' substituent behaves as a single atom and both the substituents lie in the plane of the ring. Thus the emission spectrum obtained in this case may be attributed to ¹A' - ¹A' transition. Ground state fundamental frequencies observed in the emission spectrum along with Raman and infrared frequencies are represented in Table I.

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Varanasi-5, India, April 26, 1966.

1. Cave, W. T. and Thompson, H. W., *Disc. of Faraday Soc.*, 1950, **9**, 35.
2. Sen, S. K., *Ind. J. Phys.*, 1950, **34**, 239.
3. Joshi, G., *Ind. J. Pure and Appl. Phys.*, 1966, **4**, 40.
4. Thompson, H. W. and Temple, R. B., *J. Chem. Soc.*, 1948, Part II, p. 1432.
5. Deb, K. K., *Ind. J. Phys.*, 1962, **36**, 59.

UPTAKE OF CESIUM-137 BY KATELYSIA MARMORATA

CESIUM-137 is a fission product with a long half-life (30 years), occurring in the marine environment mainly through global fall-out. It has been reported that this isotope is accumulated to relatively high levels in the soft tissues of shell-fish.¹ Hence, it was decided to study the uptake of Cs-137 by the clam, *Katelysia marmorata* Lam. (Fam. Veneridæ) under laboratory conditions. This species is common in sandy mud and constitutes a major shell-fishery.

The clams collected from the intertidal region at Mahim (Bombay) were first conditioned in the laboratory for one day. Groups of 13 specimens (length = 2.5 cm.) were kept in four polythene aquaria, each containing 2 litres of sea-water at 26°-31° C. Two aquaria contained 0.48 μc . and the other two 0.24 μc . of carrier-free Cs-137. Samples of clams were removed after immersion periods ranging from 16 to 168 hours and the soft parts dissected out for counting. 2 ml. samples of the medium were also taken simultaneously. These samples were counted for Cs-137 in a gamma spectrometer. The concentration factors (CF) were calculated by dividing the counts per minute per g. of soft parts by c.p.m. per ml. of medium. The results are illustrated in Fig. 1.

In an experiment to study the loss of Cs-137 from the animal to sea-water, 18 clams were kept for a day in sea-water containing Cs-137. They were then transferred to non-active sea-water. Samples of clams were sacrificed for counting at one-day intervals. The medium was

also changed every day. The results are given in Table I.

TABLE I
Loss of Cs-137 in non-active medium

Days	Mean c.p.m. per g. of soft parts
0	98.9
1	56.0
2	37.0
3	33.3
4	22.4

The results show that both the uptake and loss of Cs-137 in *K. marmorata* are rapid during the first day. No significant difference was observed between the CFs reached in the two concentrations of Cs-137, at each time interval. The CF for the radionuclide, at equilibrium, was 10, which was reached after 65-70 hours (Fig. 1). About 77% of the initial activity

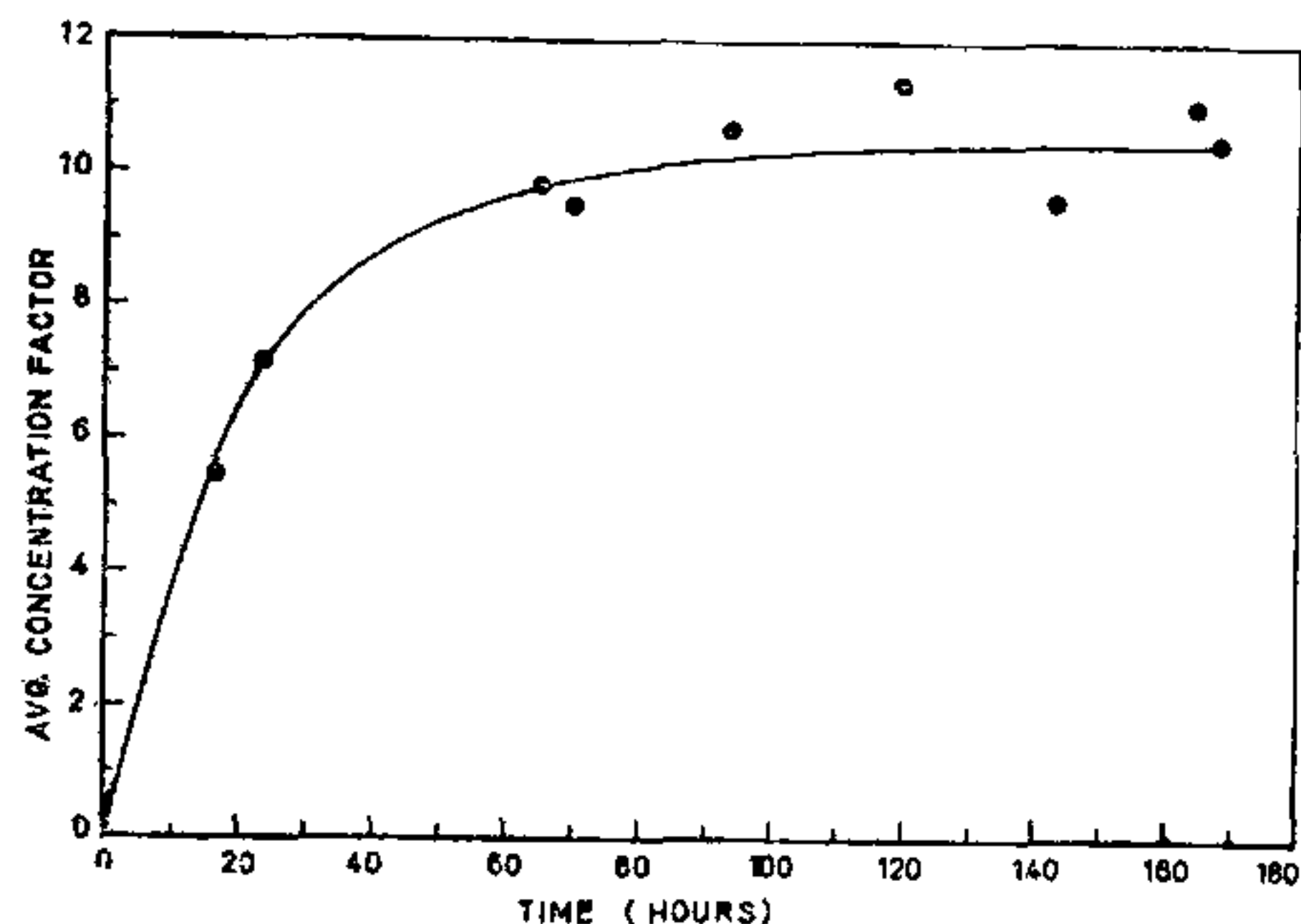


FIG. 1. Uptake of Cs-137 by the soft parts of *K. marmorata*.

was lost from the soft parts after 4 days of submergence in non-active water. Boroughs *et al.*² observed a CF of 8 for Cs-137 in *Pecten irradians* L. after 10 days and a CF of 6 in *Venus mercenaria* L. after 20 days. Bryan³ found that an equilibrium CF of 9.2 was reached in *Mytilus edulis* L. after 1,400 hours. These figures agree very well with the equilibrium CF of 10 obtained for *K. marmorata* in the present studies.

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Atomic Energy Estab., Trombay,
Bombay-74 AS, September 12, 1966.

1. Chipman, W. A., *Conf. Proc. Disposal of Radioactive Wastes*, Vienna International Atomic Energy Agency, 1960, 2, 4.
2. Boroughs, H., Chipman, W. A. and Rice, T. R., Chapter 8 in *The Effects of Atomic Radiation on Oceanography and Fisheries*, N.A.S.-N.R.C. Publ. 551, Washington, 1957.
3. Bryan, G. W., *J. mar. biol. Ass., U.K.*, 1963, 43, 519.

EMISSION SPECTRUM OF PARA-FLUOROANILINE

In continuation of our work on the ultra-violet absorption^{1,2} and infra-red spectra³ of fluoroanilines, we have undertaken a study of emission spectra of these molecules. While this work was in progress, two notes have appeared on the emission spectra of meta- and ortho-fluoroanilines.^{4,5} In this communication, we report our results on the near ultra-violet emission spectrum of para-fluoroaniline.

The emission spectrum was excited by an uncondensed transformer discharge at a voltage of about 1,600 volts through the flowing vapour of the substance in a π -type discharge tube, diameter 1.6 cm. and length 30 cm. The spectrum was photographed on a medium quartz spectrograph, with an exposure of about 6 hours. The spectrum occurring in the region 3625-3020 Å consists of about 20 rather broad bands overlapped by a fairly strong continuum. With the band at 32673 cm.⁻¹ chosen as (0, 0) band, all the bands in the spectrum have been accounted for on the basis of seven ground state and three excited state fundamental frequencies. These fundamental frequencies are given in Table I, in which are also given, for

TABLE I

	Ground state fundamentals in cm. ⁻¹	Excited state fundamentals in cm. ⁻¹
Emission spectrum	.. 174, 370, 464, 623, 847, 1275, 1346;	183, 320, 423
Ultra-violet absorption spectrum	.. 153, 457,	186, 311, 422
Infra-red spectrum	.. 835, 1275, 1325;	
Raman spectrum	.. 164, 362, 452, 635, 844, 1265;	