It was found that concentration influenced the decay rate of the compounds and strongly influenced how they changed with pressure. During excitation a filter was used on the exciting light with a transmission peak at 27 800 cm⁻¹ so as to excite only the monomer peak. Attempts were made to measure the decays while exciting the dimer peaks, but the emission was not intense enough to obtain measurements. A constant shutter speed of 60 rpm was maintained for all decay measurements.

It was found that the decay of both acridine yellow and acridine orange could be represented by a summation of three exponentials. The effect of pressure on the decay of three concentrations of acridine yellow and four concentrations of acridine orange was measured, and typical component decay times are presented in Figs. 19–21. It is noted that at high concentrations there is little effect of pressure on the component decay times, but at low concentrations they increase with pressure. In all cases there was an increase in the fraction of initial intensity due to the fast decay with increasing pressure (from about 10%–20% of the total in 50 kbar). There was a corresponding decrease in the fractional contribution of the slowest exponential component.

In order to facilitate this discussion the following facts can be listed: (a) The dimer peak for both compounds is concentration dependent and decreases in intensity with pressure. (b) The shoulder on the low-energy side of the monomer peak also decreases with pressure, which associates it with the dimer. (c) The emission peaks were located at the low energy edge of the respective dimer absorption peaks which associates
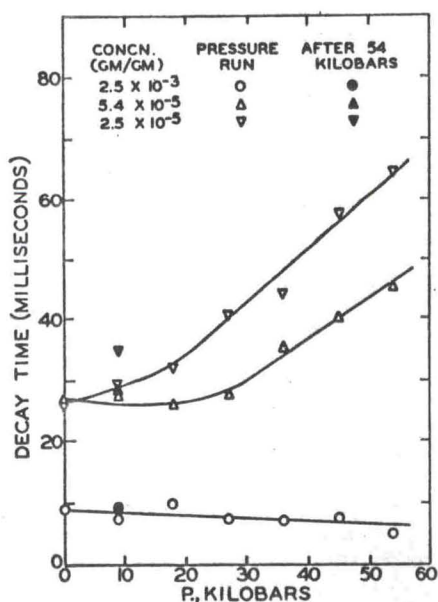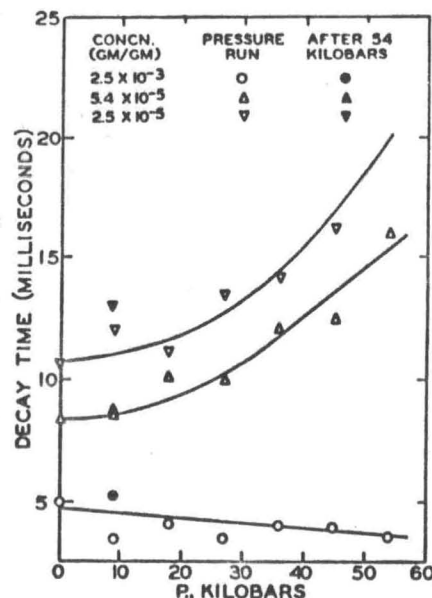

FIG. 21. Rapid component decay time vs pressure for three concentrations—acridine yellow in boric acid.

them with the dimer, while the excitation took place in both dimer and monomer peaks. (d) The effect of pressure on the emission intensity is concentration dependent; at the low concentrations there is a large decrease in intensity with pressure. (e) The effect of pressure on the decay times of the component decays is concentration dependent; at the low concentrations there is a large increase in the decay times with pressure. When measuring the decay times a filter with a transmission peak in the region of the monomer absorption peak was used on the exciting light.

From a, c, and d one would associate the emission with the dimer peak. When the emission spectra were measured both the monomer and the dimer peaks were excited, but when the decays were measured only the monomer peak was excited. In the case of the decays the excited electron could have been transferred to the dimer in either of two ways. The more likely is that the electron is excited at a monomer site wher it is trapped in a T state associated with the monomer and then is transferred to the T state of the dimer. This transfer may take place in the form of an exciton.[15] The less likely possibility is that the shoulder on the monomer peak which appears to be associated with the dimer site is excited and transfers its excited electron to the T state associated with the dimer peak. This second possibility is less likely because there is no strong line in the Hg exciting light in that region, and the filter on the exciting light is cutting off rapidly there.

The data indicate that the dimer is destroyed with pressure and that the excitation takes place in the

FIG. 20. Medium component decay time vs pressure for three concentrations—acridine yellow in boric acid.

[15] A. N. Terenin and V. L. Ermolaev, Trans. Faraday Soc. 52, 1942 (1956).