solution pH, ambient temperature, ionic strength and light intensity over wide ranges. The phosphorescence lifetime, therefore, gives an accurate measure of the concentration of dissolved O_2. By contrast, ϕ_p is not an absolute value but depends markedly upon concentration of PdP and light intensity. These same parameters affect fluorescence and phosphorescence to an equal degree, however, so that the ratio of the yields of phosphorescence and fluorescence can be used to determine accurate concentrations of dissolved O_2, since the fluorescence yield can be used as an internal standard.

Biological Environments

The above studies were extended to include determination of the concentration of dissolved O_2 in organic solvents, micelles, liposomes, vesicles, viscous media and inside the pockets of serum albumins. These studies used a range of PdP derivatives of differing hydrophobic/hydrophillic character. The luminescence properties of each PdP were determined, as above, and their reaction with molecular O_2 was quantified using laser flash photolysis methods. The effects of PdP concentration, temperature, medium, added reagents, O_2 concentration and dye stability were monitored in order to establish the ability of the technique to determine meaningful O_2 concentrations under such conditions.

The PdP derivatives were used subsequently to stain a variety of biomaterials, including membranes, mitochondria, macromolecular proteins, DNA, and both healthy and infected intact cells. The in-situ measurements were rendered difficult by the high levels of light scattering and the poor light transmitting properties inherent with such samples. It is desirable, therefore, to synthesise porphyrin derivatives that absorb and emit at long wavelengths where biological tissue is relatively transparent and light scattering is minimised. Thus, the luminescence properties of palladium(II) phthalocyanines, naphthalocyanines and "expanded porphyrins", which should absorb and emit in the near infrared region, will be evaluated in further studies. Also, it is important to ensure that the probe molecules do not perturb the biomaterial or induce photodestruction of the medium. These studies will be described in full in a later paper.

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Progress in Catalytic Technology in Japan

A review of the developments in catalytic technology made in Japan in recent years has been prepared by M. Misono and N. Nojiri (*Appl. Catal.*, 1990, **64**, (1–2), 1–30). It is suggested that the close co-operation between academic and industrial chemists is one of the factors that has contributed to the progress. Another is the effective application of new catalyst materials, such as heteropoly acids, new zeolites, bimetals and chiral transition metal complexes. One representative of each type, which is now used in a newly industrialised process, is described in some detail.

These include a novel palladium-tellurium on active carbon catalyst that has been developed for use during the diacetoxylation of 1,3-butadiene to 1,4-diacetoxyl-2-butene, under mild conditions, while a new asymmetric process for *l*-menthol production depends upon the use of optically active rhodium-BINAP to catalyse the enantioselective isomerisation of geranyldiethylamine.