

With the renaissance in optics brought about by the developments in laser physics and space research, this book has come at an opportune time and should be particularly valuable to research workers in solving real problems, as well as to academic staff, who have to set examination questions, and to students who have to answer them. I have already found it invaluable in helping tutorial students to solve honours degree examination problems. To sum up, this is an excellent book and I strongly recommend it.

D. J. BRADLEY

Where the oil is

Oilfields of the World: Geology and Geography. By E. N. Tirsatsoo. Pp. viii+376. (Scientific: Beaconsfield, 1973.) £8.50.

THE subtitle of this book, *Geology and Geography*, is an unduly large claim for a volume of only 376 pages. Nevertheless it is a useful and up to date reference book, the more valuable for its appearance at this critical time in the history of exploration of natural hydrocarbons.

The book begins with an introduction on the history, nature and occurrence of oilfields. Much of this is elementary, but it has the merit of defining and explaining many of the terms peculiar to the petroleum industry, definitions often not readily available to the non-specialist (for example 'naphtha', 'middle distillate', the niceties of varying reservoir type and of different ways of quoting reserves figures).

The greater part of the book is occupied by a catalogue of the world's oilfields. This is somewhat uneven in emphasis, with relatively modest space given to the Middle East in proportion to the bulk of its reserves (a tenth of the space for half the world's oil), but it has the particular merit of giving generous treatment of areas on which information is much more difficult to obtain—notably Eastern Europe, the Soviet Union and Eastern Asia. The treatment of the United States is perhaps disproportionately long (twice the space allotted to the Middle East) but the enormous number of small fields and the overall complexity would make any shorter treatment very difficult to arrange.

The main disappointment is that the treatment of geology is scanty in the extreme. The age and nature of reservoir beds is quoted for most of the oilfields described, but there are no stratigraphic columns, no structural maps, and no structural sections except for the generalised textbook diagrams in the introduction. With a great wealth of available material to draw upon in the world's literature, this seems a

major opportunity lost, and the brief descriptions included in the text do not go very far to fill the lacuna. The net effect has been the production of a highly informative geography of petroleum sources, but it is a catalogue rather than a stimulus to ideas.

Participants in the recent Royal Society symposium on "Energy in the 1980s" may be interested to see that units are given uniformly in barrels per day or barrels per annum. There is certainly merit in uniformity, and the author has successfully avoided the pitfalls of different kinds of tons and of (for example) the three different official conversion factors for "coal equivalents". Nevertheless it would have been useful to have had summary figures given in energy terms, in joules or 'Q', for those users of the book who are attempting to relate mineral oil to the statistics of other sources of world energy.

The book ends with a chapter on reserves, requirements and future supply, in which the potential for expansion of conventional sources, and the alternatives provided by tar sands and oil shales are discussed. Dr Tirsatsoo echoed the warnings of Warman in the United Kingdom, Halbouty, and others in the United States, that the rate of discovery of giant oilfields (the significant contributors to the world's reserves) has fallen sharply since 1960, and—writing before the current potential crisis—he concluded by underlining the decision of Kuwait and Iraq, made in 1972, to curtail production against future requirements with the apposite quotation from the Rubaiyat:

"I often wonder what the Vintners
buy

One half so precious as the stuff
they sell".

The industry has not been devoid of people clear-sighted enough to envisage the present crisis; it is a pity that governments have not always been equally prescient.

P. E. KENT

Background to a battle

The Quantum Theory of Light. By R. Loudon. (Clarendon: Oxford; Oxford University: London, November 1973.) £7.50.

THE quantum theory of electromagnetic radiation has once again become the subject of lively discussion, thanks to the advances in the field of laser physics. These advances have made easily available sources of radiation with coherence and intensity characteristics completely different from those used by experimenters in the past and have produced new controversies over the specific application of quantisation to radiation fields.

But before it is possible to enter the quite heated battles surrounding this subject, it is necessary to obtain a grounding in the basic theoretical concepts involved in the discussion of the interaction of radiation with matter. Dr Loudon's book provides an excellent beginning to such a grounding, at a level suitable for graduate students, or good final-year undergraduates.

Beginning with a review of classical radiation theory as applied to emission and absorption processes, the classical theory of optical coherence is briefly discussed. Quantisation of the radiation field is introduced, together with the properties of photon phase and number operators. This leads to a discussion of photon absorption and emission in terms of quantised field theory and a general discussion of photon optics including a brief section on laser theory and nonlinear optics.

To briefly single out only two chapters: the discussion of classical coherence theory is very well done and the notation carefully chosen so that an easy transition to the quantised approach can be made. Similarly, the discussion of photon optics provides an excellent introduction to the subject.

The general production of the book is excellent. The salting of the text with problems, which might be thought inappropriate at this level, seems an excellent idea and the references at the end of each chapter are comprehensive.

Although I have definite reservations on the blanket use of quantum field theory in optics, this book can be highly recommended to students in the field.

D. G. C. JONES

Unimolecular reactions

Theory of Unimolecular Reactions. By Wendell Forst. Pp. xv+445. (Physical Chemistry: vol. 30.) (Academic (Harcourt Brace Jovanovich): New York and London, November 1973.) \$29.50.

ANYBODY who has had a more than superficial interest in the theory of unimolecular reactions will be familiar with the names of Wendell Forst and O. K. Rice, who contributes the foreword. The latter's encouragement and stimulus to many research workers in this field, including Wendell Forst, should not pass without mention.

The volume is divided into two parts, the first of which deals with the general concept of the unimolecular process, the definition of such basic quantities as average rate and the basic assumptions involved. Slater theory is mentioned only in passing and to place its assumptions in correct perspective. There follows a discussion of intramolecular energy transfer and the assumption of energy randomisation. Chapter 4 considers the statistical cal-