

BOOKS

Petroleum Evaluations and Economic Decisions, Arthur W. McCray, Prentice Hall Inc., Englewood Cliffs, New Jersey (1975). 448 pages, \$20.95.

This book is directed to rationalizing technical evaluation, economic analysis and decision making in petroleum exploration and development, a risky business, successfully managed only by hardy (or lucky) individuals and organizations. Professor McCray accurately and lucidly states the problems, outlines approaches to solutions and presents methods for handling the information for decision making. The book is a foundation in the field for everyone involved, from students to executives responsible for successful development and government officials concerned with the effect of national policies on the industry and the commonwealth. This book also should be valuable to those in other industries where high value decisions must be made on uncertain data.

Petroleum operations typically begin with a decision on whether to explore a sedimentary basin with 10,000 square miles or more of area. The first well is a single point information source usually located on a seismically identified structure that may or may not contain petroleum; if petroleum is present, it may or may not be commercially producible considering the factors of total reserve, well production rates, cost of developing, transporting and marketing, sales price, operating taxes, income taxes and the uncertain future of prices, interest and government interventions. Management must make a nearly continuous series of "go ahead" or "stop" decisions. Cost of the concession may be \$1-100 million or more. Initial exploration cost to drilling of the first well typically would be \$1-10 million. If the first exploration well does not contain petroleum, the decision must be made whether to abandon the project or drill the next exploratory well in hope of making a discovery. The process continues in successful development through additional exploration expenditures of \$5-20 million to delineate commercial fields of 1-10 square miles each, with 1-20 wells per square mile costing \$100,000 to \$2,000,000 each. The evaluation process underlying the decision series is a continuous assessment and reassessment of the original seismic

data, well logs, test results, petroleum samples, formation cores and production data. The necessary data are actually indeterminant and may never be known even at the time the field is abandoned. The methods presented are applied to parameter evaluation, prospect evaluation, forecasting, economic analysis, planning and decision making.

Mr. McCray brings to life in print the economic and technical ambient in which the many uncertain factors must be evaluated to reach practical decisions, and importantly, the special ambient including organization objectives, size, resources, economic performance and policies. This book should assist anyone in dealing with the problems treated, both in direct solution and understanding of the total process.

C. L. DePRIESTER
CHEVRON RESEARCH COMPANY
200 BUSH STREET
SAN FRANCISCO, CALIFORNIA 94104

Benzene and Its Industrial Derivatives, Eric Hancock, Editor, Halstead Press, New York (1975). 597 pages, \$72.50.

Industrial processes for benzene and selected derivatives are covered in general descriptive survey with excellent historical introduction and background. In accordance with the earlier volumes of this series, technical, scientific and economic information is included. Advances since 1972 are not covered.

With a declared topic of such magnitude, it is obvious that even a book of this size (597 pp, 1.74 kg) must incur limitations. The production, physical properties, and analysis of benzene constitute roughly the first third of the book. The derivatives selected for treatment are cyclohexane, ethylbenzene, phenol, alkyl benzenes, and nitrobenzene. With each main heading the genesis to further derivatives is carried out. Thus, starting from cyclohexane the production of adipic acid, caprolactam, and polyamides are reviewed. Similar "begats" as ethyl benzene to polystyrene, nitrobenzene to phenylenediamine constitute the major part of the remainder of the book. Two wrap-up sections cover maleic anhydride and a catch-all "Other Industrial Uses." The index is unusually complete.

The editor acknowledges the limitations of such a compendium, both in

restricting the depth of coverage and the rapidity of technical change. These limitations are compensated for by a well edited and written survey that is easy reading. The text is augmented by the inclusion of flow sheet schematics, production-consumption data, and reaction equations. It is unfortunate that more recent developments in the use of molecular sieves for xylene separation are not included. The absence of significant coverage of aromatic carboxylic acids seems inappropriate.

The book will undoubtedly find use as a ready introduction to selected areas.

T. A. KOCH
E. I. DU PONT DE NEMOURS & Co., INC.
POLYMER INTERMEDIATES DEPARTMENT
EXPERIMENTAL STATION, BLDG. 336
WILMINGTON, DELAWARE 19898

Tables on the Thermophysical Properties of Liquids and Gases. 2nd edition, N. B. Vargaftik, Halsted Press, Division of John Wiley & Sons, Inc., New York, August, 1975. \$49.50, 758 pages.

This book is an English translation of the Russian edition. It serves primarily as a source of physical and thermodynamic properties for a large number of elements and compounds. The sources are perhaps half Russian and half from journal papers, monographs, and books from other countries. No evaluation of the data presented has yet been made.

Without question, this reference will be of real value to engineers who require numerical property data. The permanent gases and alkali metals are thoroughly covered and, to the extent that data exist, organic compounds are included. Experimental binary gas diffusion coefficients at one atmosphere are tabulated as are thermal diffusion data. Some mixture viscosities and thermal conductivities are also given.

The format is excellent and the book well indexed. The translator and publisher are to be commended. All units are S.I.

ROBERT C. REID
MASSACHUSETTS INSTITUTE OF
TECHNOLOGY
CAMBRIDGE, MASSACHUSETTS