D. H. Everett and P. T. Podoll (Chapter 2) extensively surveyed the "Adsorption at the Solid/Liquid Interface: Non-electrolyte Systems," exclusive of polymer adsorption. After the thermodynamic analysis of the problems is reviewed, the authors discuss the progress of the surface area determination and the relationship between the gas adsorption and adsorption from solution. Furthermore, adsorption from dilute and multicomponent solutions, respectively, is treated in some detail. Finally, a number of specific systems, involving a variety of adsorbents and adsorbates, is reviewed (190 references).

Chapter 3 by G. T. Barnes is devoted to "Insoluble Monolayers—Dynamic Aspects," which complements an earlier report on equilibrium aspects of surface films. Surface shear viscosity is discussed first and the theoretical and experimental progress, made in this field by F. C. Goodrich, is reviewed in particular. Different techniques for the study of time dependent processes in monolayers with time scales ranging from milliseconds to kiloseconds are summarized. Other topics in this chapter deal with mass transport through, penetration of, and reactions in monolayers with a special consideration of biological systems (320 references).

Emulsions (Chapter 4) are discussed by B. Vincent and S. S. Davis. Since a considerable number of review articles on the subject appeared in recent years, these publications are listed first. The rest of the chapter deals with the usual topics relevant to the subject, i.e., nonspontaneous and spontaneous emulsification and emulsion stability and properties (140 references).

In a short survey (Chapter 5) J. F. Goodmann and T. Walker consider factors responsible for "Micellization in Aqueous Solutions." They conclude that a proper understanding of various parameters as they affect micelle size and shape has not been developed as yet. The major obstacle to accomplishing this goal is our lack of knowledge of the problems related to water structure and hydration (37 references).

Finally, the important problems of "Structure and Reactivity in Micellar Aggregates" are reviewed by J. M. Brown in Chapter 6. Special attention is given to micellar catalysis and a large number of reactions accelerated by different types of micelles are discussed in some detail (191 references).

The readers interested in the listed topics will find the extensive literature citations most useful, although the price for the small volume ($48.50) is nothing less than exorbitant.

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Zeolites and Clay Minerals. By R. M. BARRER. Academic Press, New York. 52.50 (£25.00).

This monograph, written by Professor R. M. Barrer who has been a leader in zeolite research for many years, concentrates on the structural, physicochemical, and theoretical bases of sorption and intercalation by zeolites and clay minerals. The monograph begins with the chapter on the nature of zeolites and some of their uses, with special attention given to sorption, catalytic, and ion exchange properties and applications. The following chapter gives an excellent review of the zeolite frameworks and complete structure of the zeolites if known to include the cation and water molecule positions. The following three chapters deal with the equilibrium between the host zeolite crystals and quest molecules, the energetics of sorption, and the change of entropy for sorbed molecules. Additional discussion is focused on the thermal entropy and heat capacities of intracrystalline fluids. Chapter 6 discusses diffusion in zeolites starting with the methods of studying mobility of sorbed molecules followed by the interpretation of sorption kinetics. Additional discussion centers on chemical, concentration, and molecular size effects influencing intracrystalline diffusion. The last two chapters give a comprehensive discussion on chemisorption, sorption complexes, and molecular sieving on zeolites with the last chapter concentrating on clays which brings the extra dimension of swelling behavior of clays as contrasted to the rigid frameworks of zeolites.

The monograph is well written, concise in style, and is in keeping with the Barrer tradition. Each chapter has an extensive reference section with substantial contribution from the author's past research in each area giving the treatment of the subject matter an extra personal dimension for both the student and the expert in the field. The book is a must for anyone seriously interested in zeolites and clays and their application as sorbents, catalysts, and molecular sieves.

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Hydrocarbon Synthesis from Carbon Monoxide and Hydrogen, Edwin L. Kugler and F. W. Steffgen, Advances in Chemistry Series, American Chemical Society, Washington, D. C., 1979.

For many years it has been recognized that it is possible to convert catalytically carbon monoxide and hydrogen into methane or into higher hydrocarbons. With the advent of the current energy crisis and the continuous rise in our oil imports attention is again focused on perfecting these processes in the hope that they can play a part in utilizing alternate energy sources. This time the carbon monoxide and hydrogen will have to come from coal, oil shale, tar sands, waste products or biomass materials.

The present volume contains a collection of twelve papers which together cover some of the recent basic and exploratory work that has been done on the catalytic reaction of carbon monoxide and hydrogen over nickel, ruthenium, cobalt, copper and iron catalysts, either as supported metals or as alloys. An iron-nickel meteorite material with alkaline carbonate promoters has been studied for the formation of oxygenated products including fatty acids. One paper employs a computer to update the application of the calculation of the molecular weight and isomer distribution of the hydrocarbon products obtained over iron and cobalt catalysts.

The first paper is the only one in the book devoted exclusively to the formation of methane. It reports that specific rate measurements on the 100 face of a nickel single crystal at a pressure of 120 torr agree very well with results for polycrystalline nickel foil and for nickel supported on alumina. All of the remaining 11 papers concern themselves with various Fischer-Tropsch synthesis catalysts and with the nature of the products formed with special emphasis on the ability to form low molecular weight olefins.

The second paper presents data to show that active Fischer–Tropsch catalysts can be made from intermetallic compounds. For example, $ThNi_5$ and $ZrNi_5$ decompose during testing to metallic nickel and ThO_2 and ZrO_2, respectively. The thorium oxide-nickel catalyst has considerable resistance to H_2S poisoning and does not lose activity by forming graphitic carbon on its surface whereas the zirconium oxide-nickel catalyst poisons rapidly with H_2S and rapidly becomes overlaid with graphite.

Ruthenium catalysts are discussed in papers 3 and 4. A number of ruthenium exchanged zeolites are active and stable though the activity is usually less than that of ruthenium supported on alumina. Paper four presents the Mossbauer evidence for the formation of iron ruthenium alloys on silica gel. The authors conclude that for ruthenium percentages between 35 and 65% in the Ru-Fe content of the supported catalysts, the formation of olefins is maximized.

Promoted and unpromoted cobalt catalysts are discussed in papers 5, 6 and 8. A catalyst containing 5% Co, 10.4% Cu and 0.5% Na on alumina, yields a percent conversion that increases with an increase in pressure, in $H_2:CO$ ratio, and in temperature. The major products were C_2–C_4, C_1, C_5^+ and methanol in decreasing order of occurrence. Extensive new data are presented for the activities of supported cobalt catalysts. A cobalt-manganese-alumina catalyst seems to be the most promising of those tested for the selective formation of C_2–C_4 olefins. Potassium oxide addition enhances the specificity for C_2–C_4 olefins (paper 6). Finally for a cobalt-thoria-alumina catalyst operating at 197°C and at pressures of 6 to 16 atms some interesting new data are given on the product distribution as a function of carbon number. Plots of percent by weight of hydrocarbons against the number of carbon atoms per molecule show distribution curves having more than one maximum. One peak always exists in the range C_{20}–C_{25}. Peaks at about C_{10} and sometimes near C_{18} are also found. The number and locations of the peaks is a function of the amount of H_2S sulfur poisoning, the pressure and the $H_2:CO$ ratio. The sulfur poisoning seems to influence the absolute activity but little though it usually has a pronounced effect on the peaks in the product distribution.

Rhodium activity is the concern of two papers. In paper #7 are presented the results of measurements on rhodium foil and single crystals of rhodium prepared by the usual high vacuum techniques but tested by being enclosed in a tight-fitting metal cap that allows the use of pressures up to and above atmospheric and the employment of the usual chromatographic means of analysis. The results obtained suggest the importance of ethylene in building up the higher molecular weight Fischer–Tropsch products. Paper 11 summarizes work showing that approximately 90 atom % of the carbon in the $H_2:CO$ mixture is converted to methane, acetic acid, acetaldehyde, and ethanol over $Rh\text{-}SiO_2$ or $Rh\text{-}Mn\text{-}SiO_2$ catalysts at 250–300°C and a pressure of 30 atms. The presence of a few percent of the metal content as manganese increases the reaction rate by about tenfold.

The remaining three papers refer to different studies that have been made on iron or iron alloy catalysts. Paper 10 reports the kinetics of the formation of various carbides of iron in the presence of a 3:1 $H_2:CO$ mixture over the temperature range 473–598°K. Thermomagnetic analysis, weight changes, and x-ray analysis were used to show the conditions under which Fe_2C(Hex.), Hagg Fe_2C, and Fe_3C are formed.

Paper 12 shows that filings from an iron (10–20% Ni) meteorite promoted with alkaline earth and alkaline carbonates produce aliphatic and aromatic hydrocarbons when exposed to a 1:1 $H_2:CO$ mixture at 400°C for periods of 24 to 48 hours at a pressure of 2.5 atms. K_2CO_3 and Rb_2CO_3 but not Na_2CO_3, $MgCO_3$ or $CaCO_3$ as promoters yielded fatty acids formation. Finally paper 9 takes up the question of modifying the original simple chain growth (SCG) theory developed at the Bureau of Mines to account for the carbon number and isomer distribution in the Fischer Tropsch synthesis of hydrocarbons over iron and cobalt catalysts. The new calculations allow for the building in of C_2 as well as C_1 units. Computerized calculations are made and compared with experimental data.

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