

In brief, this is an excellent presentation of a vast amount of scattered work on clay-polymer interactions. The author is to be congratulated on a very readable book which must have entailed an incredible number of man-hours of work. I am almost reconciled to the price of the book but regret that it will put it outside the range of most individual investigators, and even libraries will have to think twice when considering then reduced purchasing power of budgets which lag behind inflation.

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GEOCHEMISTRY OF COLLOID SYSTEMS

S. Yariv and H. Cross, 1979. *Geochemistry of Colloid Systems. For Earth Scientists*. Springer, Berlin, 430 pp., 86 fig., DM110.00, U.S. \$ 60.50.

The second part of the title of this book gives an indication for whom it has been written. It is a real 'synthesizer'. Throughout ten chapters the reader is introduced into the highly complex matter of colloid chemistry and its role in geochemistry, pedology, oceanography, and geology. Originally the term 'colloid' has been applied as a grain size term for very finely dispersed matter or very large molecules which, in contrast to non-colloidal matter are characterized by (a) manner of dispersion and (b) specific chemical reactions at the surfaces of the colloid particles. Consequent extensions of these two viewpoints to surface reactions of particles much larger than colloid grains makes this book a special one.

Geologic colloid systems are the topic of the first chapter. The authors start with a treatment of clay minerals and the hydroxides of iron and aluminium, common colloid particles in soils and in natural waters. The reader's attention is specially drawn to the role of organic matter. Magmas, lavas, the ocean and the atmosphere are also discussed under the aspect of colloid properties.

Chapter two deals with the theory and the models proposed for the chemistry of

surfaces. The concept is clear, informative and will also make non-chemists familiar with the mathematical treatment and measuring techniques of interface phenomena like surface tension, capillary pressure, wetting, sorption, ion exchange, and evaporation. Special attention is focussed to ion distribution in the vicinity of solid surfaces.

The two ways of forming colloid suspensions, condensation and dispersion, are reviewed in chapter three. Precipitation of various hydroxides and aluminosilicates and chemical weathering are the topics.

Molecular composition of silicate surfaces and such non-silicates as calcite, gibbsite and goethite with respect to adsorption, abrasion and pH of the surrounding fluid are treated in chapter four.

The topic is resumed with more detail in chapters six and seven, and including those clay minerals which are the most frequent in sediments. It is demonstrated how, resulting from broken structural bonds, surface microstructures determine degree of sorption, type of specific sorption, dissolution, hydrolysis, disproportioning of dissolution and diagenesis of silica and the clay minerals. The logical arrangement is somewhat interrupted by chapter five on the kinetic properties of colloid systems. Because of its more basic content it should be ranked in the first part of the book.

The last part of the book comprises four chapters where in the principles of colloid chemistry are applied to geologic systems with more extent. The colloid properties of clay minerals, the interactions of particles dispersed in fluids, the rheology of colloid systems, and the colloid chemistry of argillaceous sediments are the topics of these last chapters.

Microstructures of soils, fluid migration, interaction of particles with humic substances in soils, pore structure, and thixotropy of muds are just a few phenomena to be mentioned which, to a large extent are influenced by colloid behaviour of geologic systems. The very last chapter contains a brief review of the principle of source rock evaluation for hydrocarbons. It is an attempt to evaluate the 'liquid window'-principle under the aspect of colloid chemistry. However, the conclusions that can be

drawn at this moment remain highly speculative and the facts remain restricted to a few citations on the presumable catalytic effect of clay minerals.

As a whole the last chapters offer very interesting viewpoints for new approaches in diagenetic research. It surely was a difficult task for the authors to cover the flood of interesting topics equally comprehensive. Many topics therefore are dealt with in more than one chapter under different viewpoints, which in my opinion, is an advantage. Remains to share the author's optimism that part of the conclusions still regarded as highly speculative in time will be shown to be correct.

For the 'eye-minded' geoscientist the book should contain more graphs. The tables and figures included are in most cases taken from other publications and reproduction has been done with high skill. An author index (references up to 1977) and a mineral index will facilitate working with this book and I would highly recommend it to researchers and graduate students who are keen in blending geoscience with other disciplines.

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SEM IN SEDIMENTOLOGY

W.B. Whalley (Editor), 1978. *Scanning Electron Microscopy in the Study of Sediments*. Geo Abstracts, Norwich, 414 pp., £ 12.75.

Scanning electron microscopy is now an essential technique in the study and interpretation of diagenetic and, to some extent, depositional processes in sediments. In his preface Brian Whalley states that this book is the first devoted to SEM in sedimentology. While this statement is not entirely true (e.g. Krinsley and Doornkamp, 1973), it is certainly true that this book provides a very diverse account of the SEM approach to sediments. For this reason alone it provides an important source reference for laboratories carrying out SEM studies, and libraries.

The book is a collection of 29 papers resulting from a symposium held at Swan-

sea in 1977 as part of the Third Meeting of the Geological Societies of the British Isles. As such it comprises something of a mixed bag in which the unifying feature is that all the contributions include SEM work. Contributions cover a wide range of SEM applications and includes: notes on sample preparation, papers on discriminating between sedimentary environments on the basis of particle surface textures, porosity and permeability investigation and more general reviews of diagenetic styles and sequences as revealed by SEM investigation. Space precludes discussion of all the contributions here.

The general style of the book is reasonable. The illustrations are mostly of acceptable quality and typographical errors are few. Each contribution is relatively short (usually no more than a dozen pages including discussion) and the format of each paper is standardized. There seems to have been no editorial clustering or organization of the papers so the book appears as was this symposium — just a collection of papers with the SEM as a thread.

Of the technique papers, that of Grant is useful in underlining the SEM application of cathodoluminescence. In this mode the SEM offers higher spatial resolutions than have been obtained hitherto by conventional optical methods. Simultaneous X-ray and orientation analysis is also possible. Tovey has several papers covering: (1) the study of sand-grain liquefaction, (2) the compression of sand grains and (3) the quantitative stereoscopic study of sand grains. This last paper predicts that SEMs will soon be capable of providing automatic quantitative spatial information using a computer link-up and sketches the possible techniques involved.

The study by Walker of microporosity in chalks illustrates an ingenious method of casting the pores in resin. After removal of the chalk with acid the pore casts can be observed directly under the SEM. In this way the high porosity (about 35%), and low permeability, of chalks is related to the small size and lamina shape of the pore throats (as measured independently by mercury injection).

Hancock illustrates the effects of inject-