

DIAGENETIC ALTERATION OF SEDIMENTARY ROCKS

by

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ABSTRACT

Diagenesis begins when sedimentation stops, and includes all the changes that come about in the development of sedimentary rocks as we find them today. A knowledge of the common diagenetic processes can help the petroleum geologist by: (1) offering a better insight into specific reservoir conditions in which oil and gas have accumulated, (2) providing a quantitative approach toward mapping parameters that will supplement other geological or geophysical data, (3) showing cause and effect relationships that allow extrapolation of stratigraphic and structural trends into areas where new reservoirs might be anticipated. Ten illustrated references and one abstract are cited that will provide the practicing geologist with a sound working knowledge of cementation, porosity and permeability, fractures and joints and regional diagenetic processes.

Popular concepts of diagenetic alteration have become confusing because geologists have attempted to employ terminology and nomenclature designed for primary rather than secondary characteristics. Clear distinction must be made between *grains* and *crystals* and between *detrital*, *clastic* and *precipitated* particles if diagnostic relationships are to be revealed.

Advances in petrology will be made when geolo-

gists are able to establish the specific controls that bring about lithification. Even more significant advances will be made when petroleum geologists are able to recognize the controls in a given area in terms of the physical and chemical changes that come about as the result of deep burial, structural flexing, folding, faulting, jointing, fracturing and weathering processes and the effect that these processes have on primary lithology, texture, fabric, packing and cementation.

Mining geologists have long recognized the value of following subtle exploration leads based on mineralization, joint and fracture patterns and regional structural control which the petroleum geologists generally have been unable to see or failed to recognize. More careful records and descriptions and/or more refined logging techniques will be the only real answer to this part of the exploration problem.

Recognition of diagenetic alteration and its effect on porosity and permeability is not difficult, neither does it require elaborate or expensive equipment. It does require patient astute observation of the rock to determine cause and effect relationships. Many forms of alteration can be predicted or anticipated from previous study of stratigraphic and structural conditions. Seven examples are cited that relate lithogenetic changes to reservoir conditions. The common types of alteration are illustrated and wherever possible related to their control.

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