

Effect of Early Cementation on the Development of Secondary Porosity in Sandstones- Examples from the Cambrian of Illinois Basin

Mojisola .A. KunleDare¹ (1) University of Missouri-Rolla, Rolla, MO

Preliminary petrographic studies of the Galesville and Mt. Simon Formations, Cambrian of the Illinois basin show porosity estimated at 18% and 25% respectively. Most of the porosity is secondary in origin; in the Galesville, it occurs as a result of framework grain dissolution whereas in the Mt. Simon, it results from hematite cement dissolution. The most important factor in both cases is early cementation although it is manifested differently in the two sandstones.

The basal Galesville shows low compaction and a high percentage of quartz overgrowths, which form a framework around abundant, irregular and oversize pores. Early feldspar dissolution in the sandstones provided silica for the development of overgrowths that held the framework open. This stabilized framework resisted compaction. The oversize pores were then created from subsequent dissolution of plagioclase feldspars. The basal sandstones may have also received quartz rich fluids expelled from the underlying shale, which may have contributed to early quartz cementation.

The Mt. Simon shows irregular laminations defined by alternation between well compacted sutured quartz laminae with stylolitic texture and porous laminae of rounded hematite coated quartz grains with overgrowths. Fluctuation in the supply of hematite at deposition resulted in alternation between hematite cemented and 'clean' laminae. During burial the uncemented layers were extensively compacted, whereas the cemented layers resisted compaction. Later, dissolution in the hematite cemented layers created new porosity. A second phase of dissolution resulted in the corrosion of quartz grains, overgrowths, as well as framework grains.