

EaES 350 Laboratory 4: Sandstones and carbonates

This lab will focus on the analysis of sandstones and carbonates in more detail. Although these rock types are not as common as mudrocks, they receive considerable attention because of their importance as resource reservoirs (e.g., groundwater, hydrocarbons) due to the fact that they are commonly porous and permeable. While careful macroscopic description of these categories of sedimentary rocks, aided by a hand lens, can take you a long way, a more complete understanding of the origin and diagenetic history of sandstones and carbonates requires the analysis of thin sections. Thin sections allow you to identify minerals (an activity known as “sandstone or carbonate petrography”), thus giving you more insight about such things as source terrains and provenance. In addition, it can elucidate the diagenetic history of the specimen investigated.

For the hand samples, use step [1] in the classification scheme from the previous lab to determine whether you deal with a sandstone or a carbonate. The subsequent goal is to classify the specimens using the Pettijohn (Fig. 2.6 in your textbook) or Dunham (Fig. 3.2) classifications. This requires a macroscopic description of the hand samples (handle with care!) in terms of grain size, sorting, mineralogy, fossil content, etc. For the sandstones, infer the relative proximity of each specimen to the sediment source area.

For each of the five hand samples you will investigate accompanying thin sections to gain understanding about the diagenetic history and possible origin of the sediments. The following procedure is recommended for thin-section analysis:

- Make a drawing of the thin section and label key characteristics (e.g., grain shape and contacts, amount of pore space, mineralogy, and any identifiable sedimentary structures or fossils)
- Use both low- and medium-power objectives because some of the component grains may be too large to recognize with the intermediate lens only
- Pay special attention to the nature of cements; in the case of carbonates, distinguish spar from micrite
- Provide a one-paragraph description of the thin section in terms of relative proportion of minerals, porosity, degree of compaction (if any) and rounding, and whether the sediments are bound by cement or matrix
- Interpret the diagenetic history

Thin-section analysis is very helpful in determining the porosity of sedimentary rocks, which in turn provides important evidence for such applications as hydrocarbon or groundwater extraction and the prediction of the migration of pollutants through such media. Provide a summarizing assessment of the relative porosity of the five rock types you have investigated.