

Sediments and sedimentary rock

1. Sedimentary rocks form from particles accumulated in sedimentary layers.
2. Sedimentary layers can be formed by [a] clastic or detrital particles (e.g., sand grains, shells, bones, clay mud and so on), [b] minerals that have precipitated out of a water-based solution, or [c] materials erupted from a volcano
3. Sedimentary layers contain geohistorical information
4. Sedimentary rock is important because [a] it forms the interface between the solid Earth and the biosphere, hydrosphere and atmosphere; [b] it contains much of the evidence of Earth's biological and climatological history; and [c] it is economically important.
5. The economic importance of sedimentary rock is based on it being the source of valuable commodities such as [a] building materials such as sand, gravel, decorative stone, clay for bricks; [b] energy resources such as oil, gas, coal and uranium; and [c] economic minerals such as iron, placer gold, bauxite and so on.
6. The history of a sedimentary grain includes [a] physical or chemical weathering, [b] dissolution or erosion -- separating the compound or particle from its original source material; [c] transportation by wind, water, ice; [d] precipitation or deposition; [e] burial and possible lithification.
7. Weathering processes are commonly divided into mechanical weathering (e.g., separating rock particles from the source through frost wedging) and chemical weathering (e.g., dissolving calcite-rich rock by exposure to acids in the environment).
8. Jointing or cracking of a rock increases its surface area.
9. Ice occupies more volume when it is frozen than when it is liquid, and can exert a tremendous stress on any rock crack as it passes from liquid to solid ice.
10. Ice wedging is most active in the spring and fall, when daytime temperatures are above freezing and nighttime temperatures are below freezing.
11. Factors affecting chemical weathering include: [a] temperature; [b] precipitation; [c] vegetation; and [d] industrial pollution.
12. Siliciclastic sediments are broken fragments of silicate rocks and mineral grains.
13. Common minerals in siliciclastic sediments include, in order of importance, quartz, clay, mica, minor feldspar (that weathers easily to clay minerals, silica in solution, and various salts), rock fragments, and dark "ferromagnesian" minerals like biotite, amphibole and pyroxene.
14. The composition of clastic sediment is primarily a function of [a] the composition of the source material from which the sediment was derived, [b] the distance the sediment has been transported -- the greater the distance, the higher percentage of quartz and other chemically stable minerals
15. Carbonate sediments are composed primarily of the minerals calcite (calcium carbonate) and dolomite (calcium magnesium carbonate).

16. Common minerals in carbonate sediments include calcite, dolomite, clay (a silicate mineral family), and various iron, magnesium or aluminum oxides.
17. Grain sizes range, from small to large, from clay ($<1/256$ mm), to silt ($1/16$ to $1/256$ mm), sand ($1/16$ to 2 mm) and gravel (>2 mm). Corresponding rock types include claystone, siltstone, sandstone and conglomerate. A shale has a layered fabric (shaley cleavage or shaley parting) and is composed of silt and clay. Mudstone is composed of silt and clay, but doesn't necessarily have the obvious layered fabric of shale.
18. Gravel grain sizes range, from small to large, from granules to pebbles to cobbles to boulders.
19. A sedimentary rock composed largely of gravel sized particles is a conglomerate. If the particles are mostly angular, it is the type of conglomerate known as a breccia.
20. Angular grains (sand size and larger) indicate that the grains have not been transported a significant distance compared with rounded grains.
21. Sediment might be transported by suspension in the transporting medium (air or water) if the particles are very small, or saltation, or by rolling and sliding along the bed surface.
22. Ripple marks and dunes are created as a result of the flow of sediment-laden wind or water.
23. Cross-beds form on the steep down-current face of a ripple mark or dune, and allow us to interpret the direction of (paleo-)current flow.