

Geology 284 - Mineralogy, Fall 2010
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The Minerals of Sediments and Sedimentary Rocks

Result from Recycling of older Rock Materials

Sedimentary Rocks and Minerals

Sediments and Sedimentary Rocks cover about 80% of the Earth's surface, but form a very thin blanket, constituting only about 1% of the Earth's volume.

They're important to us, because we live at Earth's surface!

Two main kinds of Sediments and Sedimentary Rocks

- Clastic or Detrital Sedimentary Rocks (formed of mineral grains from or fragments of pre-existing rocks)
- Chemical Sedimentary Rocks (formed by precipitation of minerals from water or alteration of previously precipitated material)

Sedimentary Rock Types

Sediments form as a result of Weathering

- Physical Weathering
- Depends on hardness, cleavage, etc.
- Chemical Weathering
- Depends on chemical reactivity of minerals
- Relative susceptibility of common minerals to weathering is summarized in Goldich's Weathering Series

Goldich's Weathering Series - see handout

Products of Weathering

- Minerals
- Ions in solution

Detrital Grains are

- Rock Fragments or
- Mineral Grains
- What Minerals?
- Almost any mineral, but
- Mostly minerals that are physically and/or chemically stable or resistant to weathering

Common Detrital Minerals

- Quartz
- Feldspars
- Clay Minerals

Detrital Quartz Grains

- Abundant
- Clear and unaltered
- Larger than detrital feldspar
- Commonly rounded
- Commonly monocrystalline

Quartz-rich Sandstone

Polycrystalline Quartz in Ss

Detrital Feldspar Grains

- Generally less abundant than quartz
- Cloudy and highly altered
- K-feldspar and Na-rich plagioclase more abundant and less altered than Ca-rich plagioclase
- Commonly monocrystalline

Clear Quartz, Altered Feldspar

Microcline in Sandstone

Perthitic Alkali Feldspar in Sandstone

Other Detrital Grains

- Micas may be present: Musc > Biotite
- Olivine and Pyroxene rare
- Accessory (detrital) Minerals
- Hard, chemically resistant minerals without good cleavages
- Garnet ($(\text{Mg,Fe})_3\text{Al}_2\text{Si}_3\text{O}_{12}$), zircon (ZrSiO_4), rutile (TiO_2), tourmaline, etc.
- Examples from heavy mineral separates of loose sediments

Detrital Zircon (ZrSiO_4) Separate – Why is zircon important?

Detrital Rutile (TiO_2) Separate

Grain Size is significant in Sedimentary Rocks