Rocks and their properties

Rocks always consist of one or more minerals. They differ in their properties and therefore also differ in their ability to, for example, store water or form steep rock cliffs.

The most common minerals in the Natur- & UNESCO Global Geopark Mëllerdall are quartz, clay minerals, and two different carbonates.

- Quartz is a mineral with very high resistance to erosion. It forms when magma cools, and through a cycle of erosion, transportation, deposition, and rock formation it is integrated again and again into new rocks. It is most commonly seen in the form of sand grains.
- Clay minerals are a group of minerals that take on the form of very small, flat particles. They are formed by the chemical erosion of certain minerals at the surface of the ground. These too can be integrated into new rocks multiple times.
- The regional carbonates are dolomite and calcite (calcium carbonate). These form as a consequence of evaporation, mainly of seawater, and from the calcium-rich shells of marine organisms. They are dissolved by acid rain at exposed surfaces, and transported in solution by rivers into oceans. There, they are reassembled either due to evaporation or by being integrated into shells by marine organisms
- Gypsum is a very common mineral in some sedimentary layers of the Natur- & UNESCO Global Geopark, but it does not form rocks…

The following kinds of rocks can be found in the region:

- Sandstones: these consist of grains of quartz flushed into the oceans by rivers, and glued together by a cement. This cement can be calcium carbonate, dolomite, or iron oxide (among others):

"Born Sandstone" (Buntsandstein)

"Born Sandstone" (Muschelkalk)

"Luxemburg Sandstone" (Liassic)

(currently missing: “Schilfsandstein” (Keuper))

- Limestones and dolomites respectively consist of the minerals calcium carbonate and dolomite. These are formed during the evaporation of saltwater from oceans and the accumulation of calcium-rich shells from marine organisms

Dolomite (Muschelkalk)

(missing: Limestone)

- Marl: a mixture of clay minerals with calcium carbonate or dolomite. In the region marl deposits from different geological eras can be found.

Marl (here: Keuper)

Many of the properties of these rocks correspond to those of the minerals they are made of.

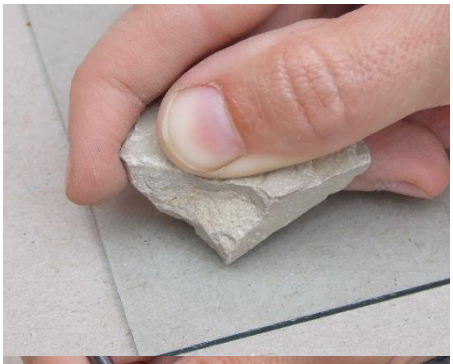
A typical, easy to test property is the hardness of the rock:

- Quartz and all quartz-containing rocks (in this region these are sandstones) are hard enough to scratch glass.
- Carbonates and pure carbonatic rocks (in this region these are dolomite and limestone) are not hard enough to scratch glass. However, they can be scratched with a steel pin.
- Claystones and the clay minerals they consist of are so soft that they can be easily scratched with a steel pin, and sometimes even with a fingernail. They cannot scratch glass, but easily fall apart under pressure.

When mixed the resulting rocks show both properties.

Try it out!

The quartz grains in sandstone scratch glass.



Dolomite cannot scratch glass.

Clay minerals can be scratched by a steel pin (in this photo slate is substituted for marl).

One can scratch the mineral gypsum with a fingernail.

Other properties of these rocks are discussed under the headings Groundwater and Geomorphology.

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