

## Rocks

### The rock cycle

Lava on the surface and thin sheets of magma cool down quickly, and form igneous rocks with small crystals.

Molten rock on the surface is called **lava**. When lava cools down it forms **extrusive igneous rocks**.

Rocks are broken up by **weathering**. Fragments of rock are moved by gravity, wind, water or ice. This is called **erosion**.

Heat from magma can change nearby rocks into metamorphic rocks.

The outer layer of the Earth is called the **crust**. Beneath the crust is the **mantle**.

Large bodies of magma cool down slowly and form igneous rocks with large crystals.

Any type of rock can become buried beneath the Earth. Heat and pressure can change the minerals in the rock and form a **metamorphic rock**.

If rock gets hot enough it melts and forms **magma**. When magma cools down it forms **intrusive igneous rocks**.

**Chemical weathering** happens when acidic rain water reacts with minerals in the rock.

**Physical weathering** happens because of temperature changes. The minerals in a rock expand if the rock gets hot, and contract if it cools. These changes in size can produce strong forces. If the rock is heated and cooled over and over again, the forces can make cracks in the rock. This is called **onion-skin weathering**.

**Physical weathering** can also happen if water gets into a crack. Water expands when it turns into ice, and makes the crack wider. This is called **freeze-thaw action**.

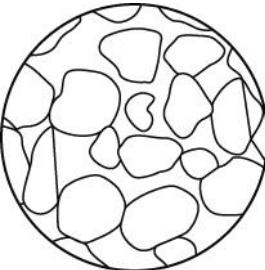
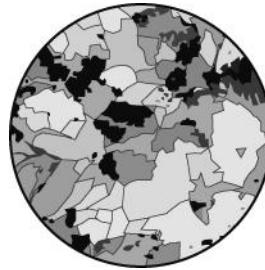
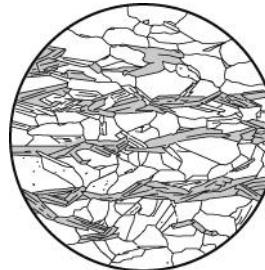
**Biological weathering** is when rocks are broken up or worn away by plants and animals. For example, plant roots can grow into cracks in rocks and make the cracks bigger.

Rivers slow down when they enter the sea, and the **sediments** they are carrying are **deposited** on the sea bed and usually form layers.

The higher layers squash the lower layers, squeezing out the water from the gaps between the grains of sediment (**compaction**). Dissolved minerals in the water can crystallise in the gaps, forming a 'glue' that sticks the grains together (**cementation**). This process forms **sedimentary rocks**.

## Rock textures

Rocks are made of **grains**. Each grain is made of a naturally occurring compound called a **mineral**. The **texture** of a rock is a description of the size and shape of the grains.

| Type of rock        | Sedimentary   | Igneous  | Metamorphic   |
|---------------------|---|--|---|
| Examples            | limestone, sandstone, mudstone, chalk   | basalt, gabbro, granite  | marble, quartzite, slate, schist, gneiss  |
| Grains or crystals? | separate grains   | interlocking crystals that are not lined up  | interlocking crystals, often lined up in bands of different colours                 |
| Hard or soft?       | often soft or crumbly   | hard   | hard  |
| Porous?             | often   | not usually  | not usually   |
| Example of texture  |  |  |  |

## Fossils

Fossils can form when dead plants or animals fall to the bottom of the sea. If their remains get covered by other sediments they do not rot. As the sediments turn into sedimentary rock, the shape of the organism is preserved in the rock. When a dead organism forms a fossil, its form can still be seen because its hard parts have been turned into stone.

## Materials from the Earth

Many of the materials we use are obtained from the Earth. We use stone for building. **Cement** is made from **limestone**, and **concrete** is made by mixing cement, sand and **gravel** with water.

We also obtain metals from the Earth. Unreactive metals like gold and silver are found in their **native states**. Other metals are found as parts of minerals. An **ore** is a rock with enough of a particular mineral in it to make it worth mining. Pure metals are obtained from minerals using chemical reactions.

Mining for metals can destroy habitats and cause pollution.

If we **recycle** metals we will:

- make supplies of metals last longer
- reduce amounts of mining (and so reduce the pollution and environmental damage this causes)
- reduce pollution caused by putting metals in landfill sites.