

For Teachers

MineralCheck

Module 1

Objective: Identification of mineral samples

Necessities:

1) Mineral samples for identification.

Each group of students need 3 different samples of minerals. Groups can have the same minerals to identify or different. These are the minerals that can be identified with the Mineral Identification Key - MineralCheck: Quartz, Orthoclase, Plagioclase, Muscovite, Biotite, Pyroxene, Kyanite, Amphibole, Olivine, Tourmaline, Garnet, Calcite, Dolomite, Graphite, Sulphur, Halite, Fluorite, Pyrite, Hematite, Galena, Gypsum, Talc, Magnetite, Cinabarite, Wulfenite, Sphalerite, Serpentine, Bauxite. They are the most common on earth and are also used a lot in everyday objects. Recommended site for ordering:

<https://www.geologysuperstore.com/rocks-minerals-fossils/mineral-specimens/minerals.html>

2) Geological investigation kit.

The geological investigation kit contains a magnifying glass, a copper coin, a nail, a glass pane, a ceramic tile, a magnet and a dropper for hydrochloric acid. To measure specific gravity, you will need a force measuring device, a net, and a glass. If you order a set, it costs about 30 EUR, you can also assemble it yourself. Links to recommended ordering sites:

- [Force measuring device](#)
- [Geological investigation kit](#)

3) Printed worksheet on A4 paper (Appendix 2) for each group.

4) Printed teaching aids (Appendix 3) for each group or available on the workstations

5) Printed Mineral Identification Key - MineralCheck on A3 paper (Appendix 4) for each group or available on the workstations.

Procedure

Each group of students is given the necessary materials. First, with the help of teaching aids (appendix 3) and a geological investigation kit, students list the properties of the mineral on the worksheet (appendix 2). Properties that students describe are crystal shape, lustre, colour, streak colour, transparency, cleavage, hardness, specific gravity, magnetism, reaction with acid, and sensory properties. Look at Appendix 1 - Properties of Minerals to learn more about these properties and how to describe them. The order in which the properties are described is not relevant, but it is important to fill in all the boxes.

After students describe the properties, directs students to the Mineral Identification Key – MineralCheck (appendix 4). By answering the questions in the identification key and comparing the listed properties in the key with those on the worksheet, students find the name of the mineral and rank it according to the European Initiative on Mineral Resources. And then continue the activity according to the suggested learning path in the Teachers Card.

For Teachers

MineralCheck

Additional Safety Notes



Work with the investigation kit:

- Students need to be careful with the glass and the streak plate - not to break it or cut themselves with it.
- Students need to be careful with the nail or some other iron object, so they do not cut or stab themselves.
- Since working with acids is dangerous in school environment, use only dilute hydrochloric acid. We use 10% or 1 molar HCl. If you feel that maturity of the students is not suitable for working with dissolved HCl, alcoholic vinegar can be used. In this case, the reaction is slightly less turbulent and harder to notice.

Calculations

For calculations of the specific gravity with this experiment, we use Archimedes' Principle. Archimedes discovered that the weight of body in air minus its weight in water is equivalent to the weight of the water displaced by the body. When a body is placed in water, the volume of water displaced is equal to the volume of the body. When the body is placed in water that it undergoes an apparent loss of weight. This loss of weight is equal to the weight of the water displaced.

loss of weight in water = weight of the object in air – weight of the object in water

So, all we need to do is weigh the object in air first and then suspend it in water for the second weighing. And then use this formula to calculate the specific gravity:

$$\text{Specific gravity} = \frac{\text{weight of the object in air}}{\text{weight of the object in air} - \text{weight of the object in water}}$$

Conclusions

Some important points to remind or discuss with students:

- A mineral is a naturally occurring, homogeneous solid that normally occurs in inorganic precipitation processes. It has a fairly constant but not fixed chemical composition, an ordered crystal structure, certain morphological forms and properties.
- Minerals surround us in everyday life at every step. Modern society depends on them, as minerals are used to construct buildings and smart devices depend on the power supply through copper wires to our homes.