

RESISTIVITY OF ROCKS AND MINERALS

Purpose

To discover which rocks, minerals and fluids conduct electricity and which do not. This information is important when using resistivity for prospecting, either on the surface or down the hole.

Activity I Rock and mineral samples.

Place the two prongs of the meter firmly onto the sample. If there is no sound, or the needle indicates no conductivity, move the prongs a little to make a better contact. Record the name of the material and the result.

Activity II Reservoir rocks

As above.

Teacher's Section

Requirements

Simple resistivity meter. I use a damp tester which makes a noise whose pitch varies with conductivity. Alternatively a multimeter can be used on a resistance range

Activity 1

A variety of igneous, metamorphic and sedimentary rocks, say two of each.

A variety of minerals, all the common sulphides and oxides and a few other common minerals.

Activity II

Three samples of sandstone and of oolitic limestone, one of each saturated with formation water (tap water), oil (cooking oil) and gas (air).

Notes

If the students have to identify the samples in Activity 1 then it is a good revision exercise as well. Usually I give each student one or more samples and the attached form. The damp tester is passed around and as it comes to each student he tests his sample(s) and calls out the name of the sample and the result. Students then put the results on the attached form.

Results

No dry rocks conduct electricity except anthracite, all sulphides do except sphalerite. Oxides sometimes do depending on the sample. Other minerals do not.

Water saturated sandstones and limestones do conduct electricity but oil and gas saturated ones do not.

Time

2 minutes per sample

Cost

Damp tester £14

Resistivity

Test each of these samples for its electrical resistance and note if it acts as a conductor (C) or a resistor (R).

Rocks

Granite

Basalt

Marble

Slate

Sandstone

Shale

Coal

Ore Minerals

Magnetite Fe_3O_4

Haematite Fe_2O_3

Cassiterite SnO_2

Galena PbS_2

Sphalerite ZnS_2

Chalcopyrite $CuFeS_2$

Pyrite FeS_2

Gangue minerals

Quartz SiO_2

Calcite $CaCO_3$

Fluorite CaF_2

Other minerals

Graphite

Reservoir rocks

Water saturated sandstone

Gas saturated sandstone

Oil saturated sandstone