

# 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**