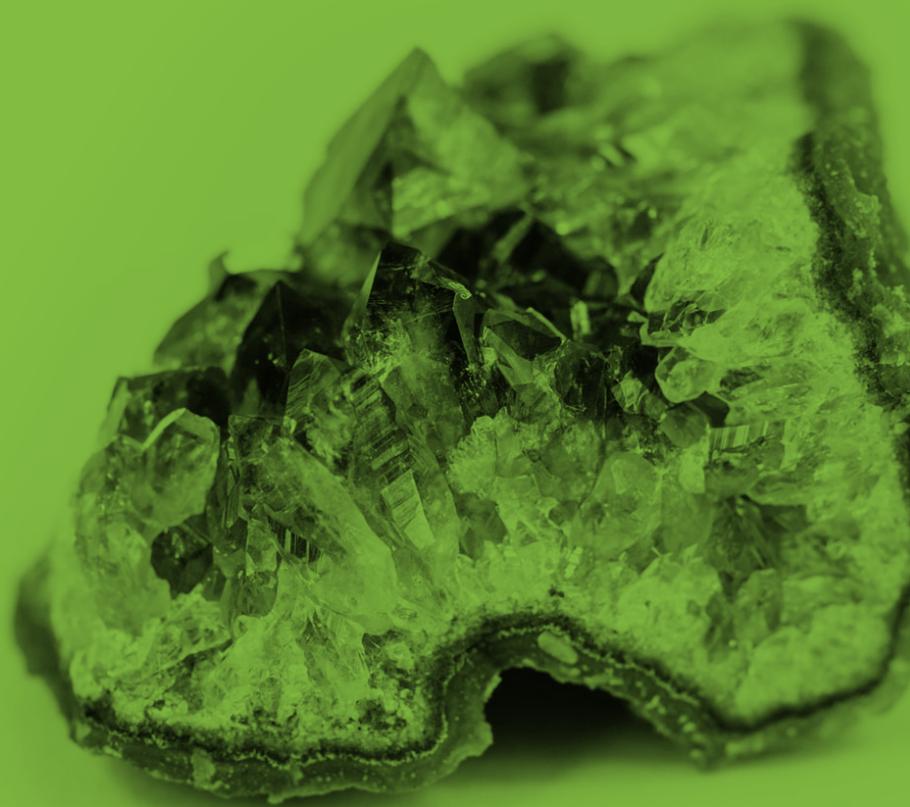


GCSE (9-1)

WJEC Eduqas GCSE (9-1) in
GEOLOGY

Practical Guidance Sheet 6



GCSE Geology Practical Guidance Sheet 6

Title: Distinguishing permeable from impermeable sedimentary rocks

Specification reference: 1.3c

Appendix B: The requirement to use appropriate apparatus to record a range of quantitative measurements including mass and volume is stated in Appendix B.

Aim: To determine the relative permeability of a range of sedimentary rock samples.

Apparatus:

Samples of sedimentary rocks
Electronic balance
Water
Graduated (measuring) cylinder

Method:

1. Select a sedimentary rock sample.
2. Determine the mass of the sample using an electronic balance. Record the result.
3. Determine the volume of the rock sample by:
 - immersing the specimen in water in the graduated cylinder.
 - measuring how much the water rises (in ml). Record the result.
 - converting to cm^3 ($1\text{ml}=1\text{cm}^3$). Record the result.
4. Soak the rock sample in water for approximately 24 hours.
5. Remove the rock sample from the water, dab the surface water from the sample.
6. Determine the mass of the soaked rock sample using an electronic balance. Record the result.
7. Repeat for a number of sedimentary rocks.

Analysis:

1. Calculate the volume of water taken in by the sample by calculating the weight gain of the sample after immersion in water. The volume taken into the rock in millilitres (ml) is the same as the gain in mass in grams (g) ($1\text{g}=1\text{ml}$). Record the result.
2. Calculate the volume of water taken in by the sample as a % of the volume of the rock using the following equation:

$$\frac{\text{volume of water taken in by the rock sample (ml)}}{\text{volume of the rock sample (cm}^3\text{)}} \times 100$$

The higher the %, the greater the permeability of the rock.

3. Compare the values for a range of sedimentary rocks.
4. Explain the variation of results for different sedimentary rocks.

Evaluation:

Consider any inaccuracies in the experiment and suggest improvements in the method.

Teacher/Technician notes:

A range of sedimentary rocks should be used, including limestone, shale, well sorted and poorly sorted sandstones. Chalk although not listed in section 1.3 of the specification could be used, forming a useful link to aquifers in section 4.2.

Soluble sedimentary rocks such as halite and gypsum cannot be used in this experiment.

A simplified version of the experiment could be undertaken by observing the effects of dropping water on specimens. Care should be taken to control the volume of water added and the timescale over which the observations are made.