ACTIVITY 3. Rocky Predictions and Explanations

Ask the pupils to weigh the red/brown rock (sandstone) and the speckled rock (granite) and write down the results so they can be used later.

Ask the pupils

'Predict what will happen to the masses of the rocks when they are placed in water, and explain your predictions.'

Give them three options - the rocks could: stay the same weight; get heavier; or become lighter. Ask the pupils to write their predictions down, then ask the class what they have written so that you can get a feel of what they are predicting.

Possible answers

Pupils often predict that the red/brown rock will get heavier but the speckled rock will stay the same. When asked why they have made these predictions, they may answer that water will get into the red/brown rock and make it heavier but it won't get into the speckled rock.

Ask them to put the samples, at the same time, into a clear plastic container of water and watch carefully to see what happens. They should take them out again after about 30 seconds.

Ask them to carefully dry the rocks on towels (paper or cloth) re-weigh them and check their results against the previous masses.

Figure 3: Sandstone 'bubbling' in a plastic beaker
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Figure 4: Granite not 'bubbling' in a plastic beaker
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Results expected

They will find that the red/brown rock (sandstone) has increased markedly in mass but that the speckled rock (granite) has not (unless very sensitive scales are used, when the remaining wetness of the granite causes a small increase in mass). So, the pupils probably predicted correctly.

If they have observed the samples carefully, they will have seen a few bubbles on the surface of the granite. But many more bubbles come from the sandstone, and continue to bubble as the air is driven out.

It is useful to have a discussion on how the air is driven out. Do most of the bubbles come from the bottom or the top? Does most of the water go in at the bottom or the top? Are the pores (gaps between the grains) likely to be interconnected?

The air rises from the top, as it has a lower density than water, this allows atmospheric pressure to push water into the bottom to replace it, showing that the pore spaces must be interconnected and the rock is permeable (permeability is the flow of fluid through a material). So, the bubbles come from the top as water is pushed into the bottom.

Note: The rate of flow of a fluid (liquid or gas) through a material is its permeability – the property mentioned in the National Curriculum for Science. This depends on the porosity – which is the percentage of pore space in the material (and is not a term used in the National Curriculum). Rocks with a high percentage of porosity (lots of pore space), where the pores are interconnected and not too small for fluid to flow through, also have high permeability. Low porosity gives low permeability.