



Conservation activity

The biscuit challenge!

Main learning points



- Stone is not solid and can absorb water over time.
- Applying a protective layer can help protect and conserve buildings.

Resources required



- Kitchen roll/paper towels
- Digestives – plain and chocolate coated
- Water and red food colouring
- Droppers or syringes

Introduction: What is stone?



Stone is rock cut into sections to use for building. It is not a completely solid material and is made of particles (minerals) and gaps or pores in between. Water can slip through the surface (absorption) into these pores but it can dry up again (evaporation).

Materials with pores are called porous. The porosity of materials is the amount of empty space within them and this can be measured. Different types of stone have different porosity levels.

Why do we use stone?

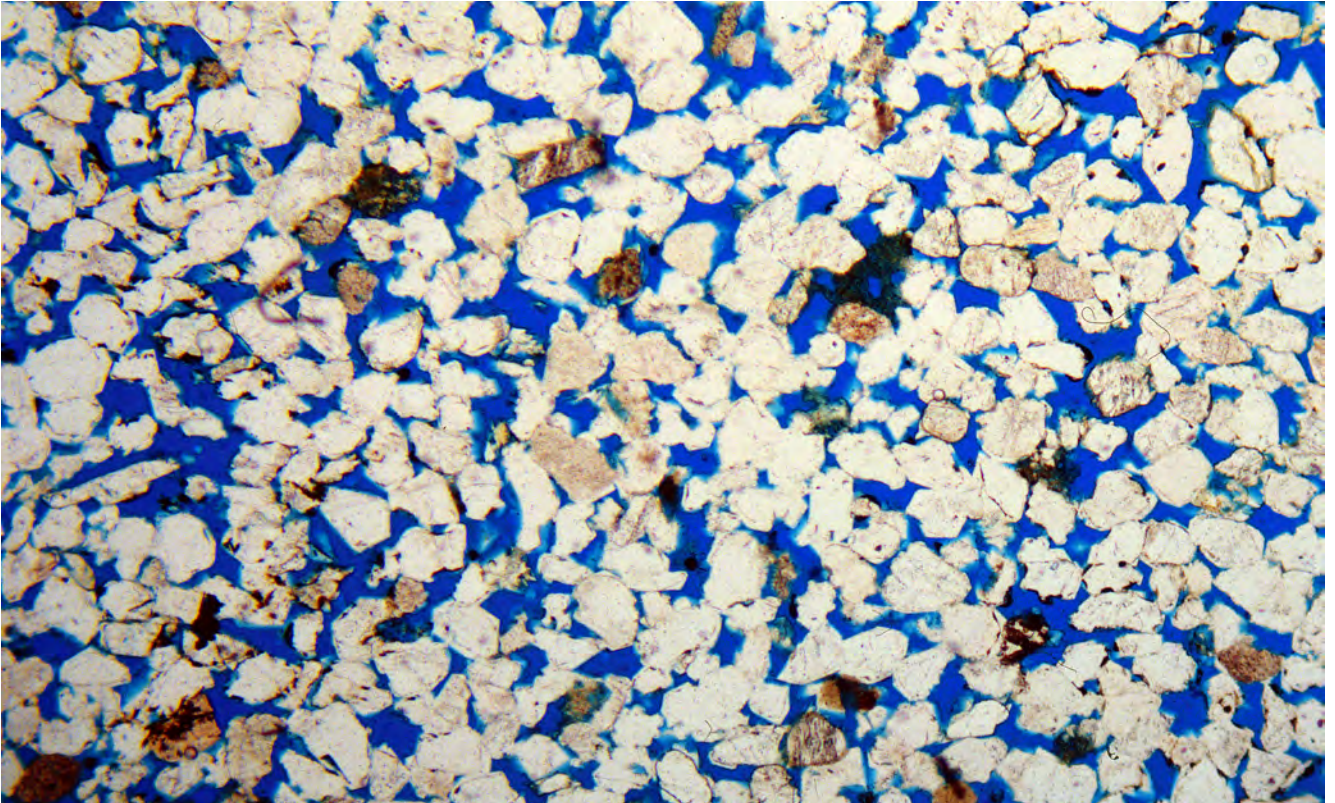
Ask why we use stone to build with. The responses should highlight that stone is a very strong and durable material capable of protecting us from the weather.

Activity

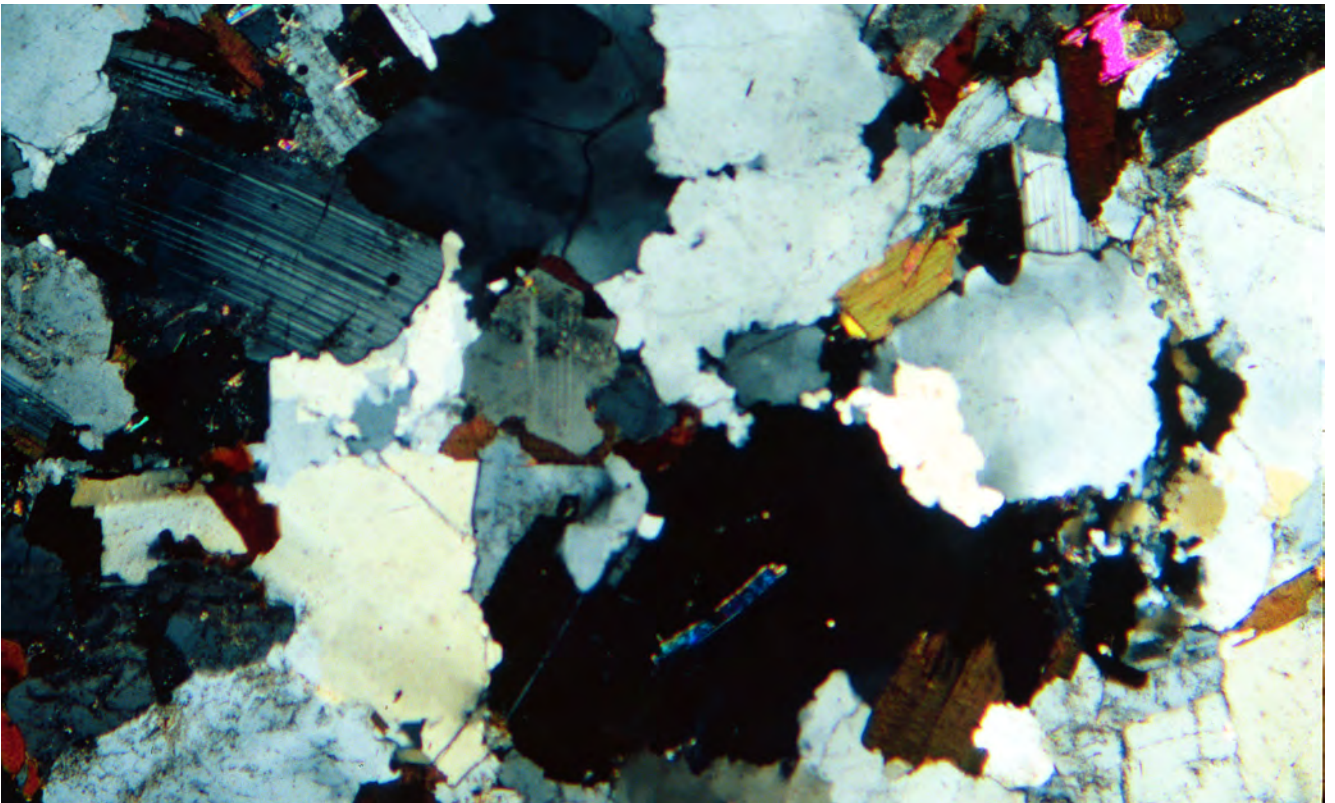


- Divide participants into groups and provide each group with the **activity instructions**.
- Provide each participant with:
 - a plain digestive biscuit and a chocolate coated one
 - a piece of kitchen roll/paper towel
 - a liquid dropper
 - a glass of water with red colourant (latter optional but makes it visual)
- Instruct participants to drop liquid on the plain biscuit and the chocolate side of the other biscuit, keeping count of the drops, alternating and applying the same amount to each.
- Wait several minutes, then ask them to turn over the biscuits to see what has happened eg. if the coloured water has seeped through. They should see that the plain biscuit is red and/or soggy underneath, but not the chocolate one.
- Give out the **activity explanation**.
 - The plain biscuit represents stone which has absorbed water. If exposed to lots of water, even stone will go soggy!
 - The chocolate biscuit represents stone with a protective covering like limewash on it. Limewash can slow down stone from absorbing rain.

Activity resource: What is stone?



This is a thin section of sandstone under a microscope.
The blue areas are holes or gaps and show that sandstone is very porous.



This is a thin section of granite under a microscope.
There are no holes or gaps visible, so granite isn't very porous.

Images © British Geological Survey/NERC via SCRAN

Activity resource: Why do we use stone?



Dumbarton Castle



Melrose Abbey

Activity instructions: The biscuit challenge

Resources required

- kitchen roll/paper towels
- one plain digestive biscuit
- one chocolate coated biscuit
- water (with red food colouring)
- one dropper or syringe



What to do

- 1 Place your plain and chocolate-coated biscuits (coated side up) on the kitchen roll.
- 2 Fill dropper/syringe with water.
- 3 Add one drop of water on to the plain biscuit.
- 4 Add one drop of water to the chocolate side of the coated biscuit.
- 5 Repeat step 3 and 4 a few times. **Remember!** Be careful to add the same amount of water to each biscuit.

? What do you think will happen?

- 6 Wait for around 30 seconds and check underneath each biscuit.

? Can you see any red liquid on the bottom of either biscuit?

? What has happened to the biscuits?



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Activity explanation:

The biscuit challenge: lime wash protection

Conservation work protects places which are important to us so that people will still be able to visit them in the future. It includes repairing or replacing parts of buildings that have become damaged or worn and using traditional materials which have been used for centuries.



Mortar pointing, Edinburgh Castle



Limewash at Culross Palace

Lime is a traditional building material created by burning limestone rock to very high temperatures. It is often used in **mortar**, a paste which sets like a hard glue to stick stone and brick together. Mortar is also used for **pointing** (filling the gaps between stones).

Limestone rock has tiny holes in it which means it can absorb water, a bit like a sponge. But it also means that the water can **evaporate** or dry up more easily. This property is called **porosity** and is very useful, because if water seeps into stone and can't escape, then it can cause the stone to break up and decay.

Since lime can help water evaporate, it is also useful as a liquid coating for buildings to protect them from the weather. This yellowish coating is called **limewash** or **harling**. If stone walls are covered in limewash, it helps protect them from rain damage just like the **chocolate coating** on the digestive biscuit helped stop it being soaked through with the coloured water in the experiment.

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