

Make your own aquifer – 1 with sponges

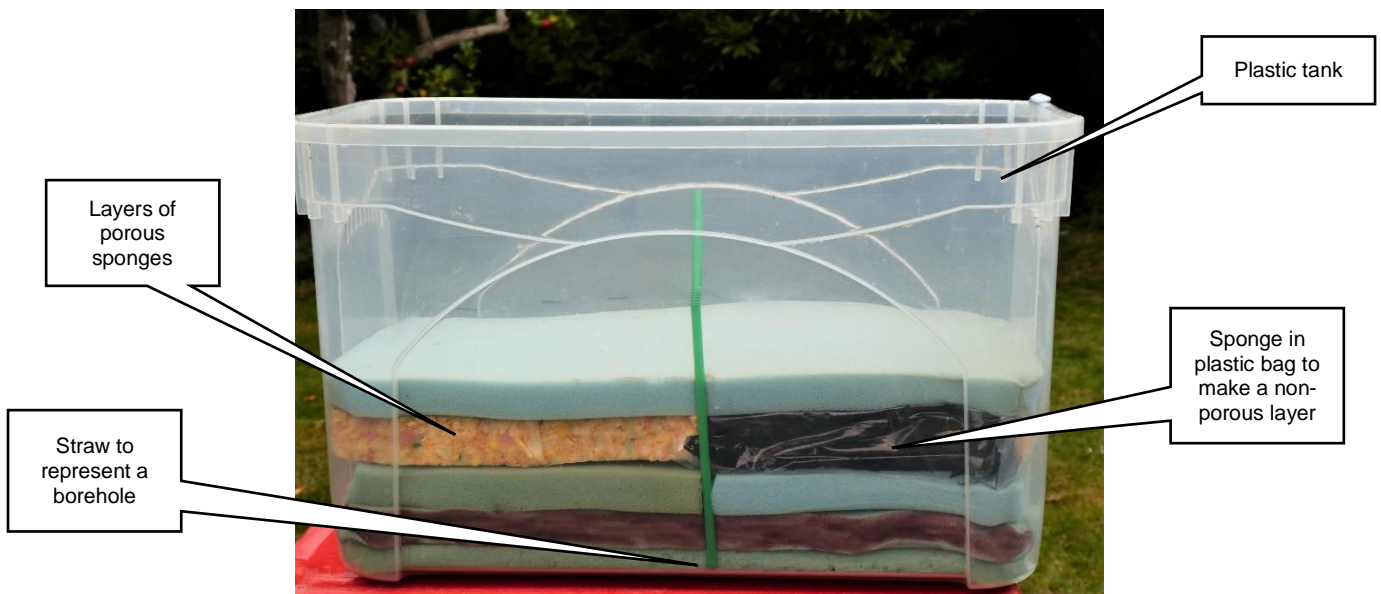
A clean way to demonstrate water in pores in rocks

Some books show groundwater only in caves or underground rivers. However, most groundwater is stored in the small spaces or pores between the grains in sedimentary rocks, or in the fractures of other rocks. A rock which stores water in this way is called an **aquifer**. Activities with sand and gravel are common to show how groundwater fills these pore spaces but they are time-consuming in a lesson, cannot usually be re-used and are

messy to clean up. This activity provides an alternative.

There is also a video of the activity which would save building up the model. See Useful links below.

Fill a tank, or other suitable container with two or three sponges. It helps if the sponges fit the container. Point out to the pupils that they can do this at home for themselves.



Ask the pupils:

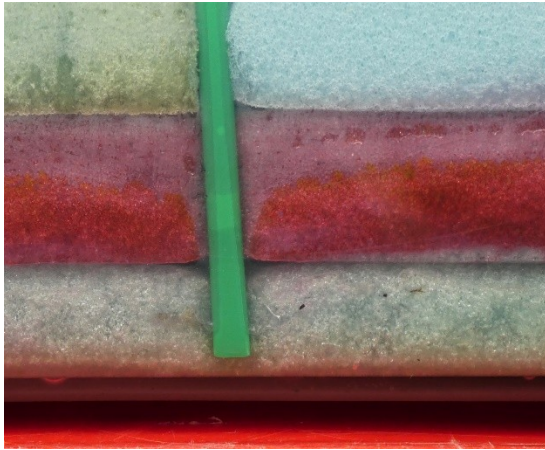
- what will happen if some water is added? If possible, colour the water so it shows up against the colour of the sponges;
- to watch carefully as you slowly pour the water over the sponges. *They will see that gradually the water will fill the pore spaces in the sponges;*
- what types of rock do the sponges represent? *They represent porous sedimentary rocks, i.e. pore spaces between the grains;*
- what will happen if a sponge wrapped in a plastic bag is put into the tank? Demonstrate this with fresh dry sponges;
- to watch carefully as you slowly pour the water over the sponges. *The water will not penetrate the sponge in the bag but will flow around it;*
- why did this happen? *Because the plastic bag will not let water pass through it;*
- what type of rock does the sponge in the bag represent? *It represents a non-porous rock, i.e. water cannot enter the pore spaces. In this activity the plastic bag is preventing entry but in the real world the pore spaces would be completely filled with a natural cement;*
- what will happen if a pipe, or well, is inserted into the sponges? *Nothing will happen unless*

you suck on the pipe, or, in the real world, pump the water out;

- to watch carefully as you gently suck on the pipe. *The water will flow towards the pipe making a cone shape.*



Water being drawn up in the syringe from the "borehole"



The base of the "borehole" showing water being drawn up from the pore spaces within the foam

The back-up

Title: Make your own aquifer – 1 with sponges

Subtitle: A clean way to demonstrate water in pores in rocks

Topic: This activity uses sponges to demonstrate water in pore spaces in sedimentary rocks.

Age range of pupils: 9 years upwards

Time needed to complete activity: up to 30 minutes, once the model has been constructed

Pupil learning outcomes:

Pupils can:

- state that some sedimentary rocks have spaces or pores between the grains and are porous;
- show that sponges can be used to simulate these porous sedimentary rocks;
- state that a porous rock which holds water is called an aquifer;
- show that water can be extracted from aquifers;
- demonstrate the effect of a non-porous or impermeable layer on the flow of water.

Context:

This activity may be used in science and geography lessons when studying the water cycle or water management.

Following up the activity:

- Investigate situations where salt water has infiltrated aquifers, so polluting the water supply.
- Draw a map of the aquifers in use in your area for water supply

Underlying principles:

- Sedimentary rocks which have spaces or pores between the grains are porous.
- Aquifers are porous, permeable rocks which hold water.
- Water can be extracted from aquifers via wells.
- A cone of depletion occurs at the base of the well as water is pumped out at the surface.

Thinking skill development:

Answering and discussing the questions as the activity is demonstrated involves construction and metacognition. Introducing the sponge in a plastic bag involves cognitive conflict and relating the activity to the real world is bridging.

Resource list:

- water supply
- colouring agent
- transparent container
- sponges
- container to pour the water
- transparent plastic bag
- pipe

Useful links: For a video of this activity see:

https://www.earthlearningidea.com/Video/417_Aquifers_1.html and for a model of the London basin see:

https://www.earthlearningidea.com/Video/418_Aquifers_2.html

Source:

Adapted by The ELI Team from an original idea of Dr. Marta Ferrater of the Prof. Institut Manuel de Cabanyes, Spain

Photographs by P. Kennett

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