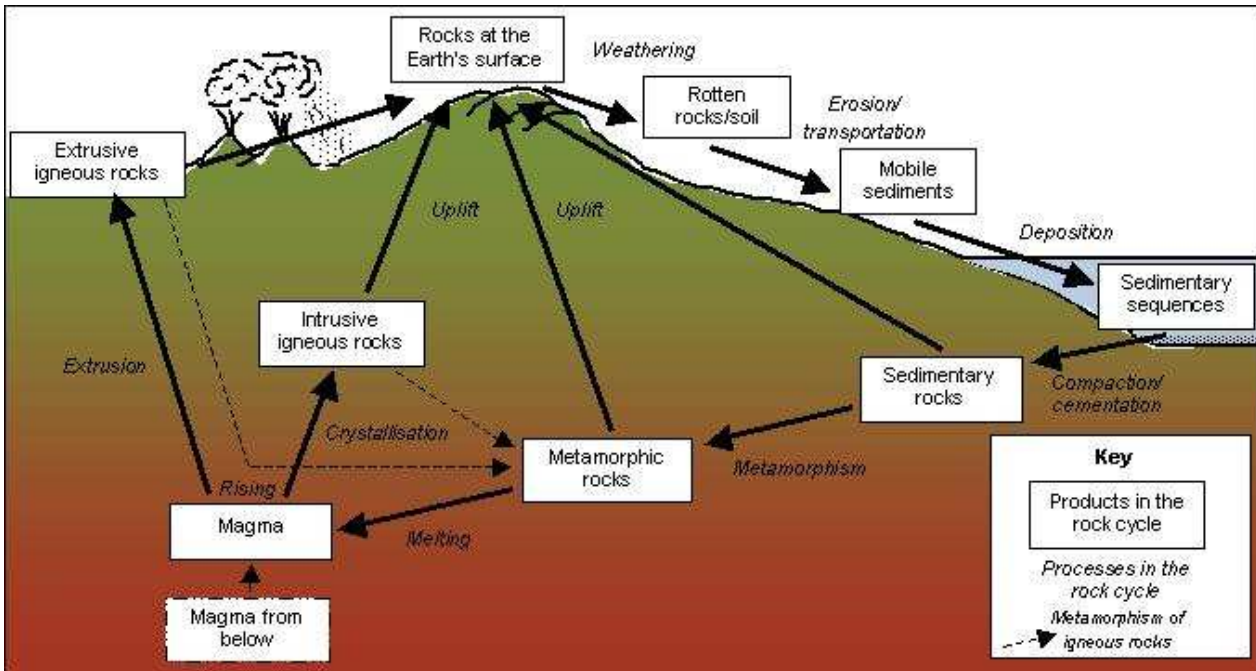


The rock cycle in wax Using a candle to demonstrate the rock cycle processes



Revisiting the rock cycle

When you have taught about the rock cycle, revisit and revise it with your pupils using a candle, as follows. After each demonstration, ask: What rock cycle process does this represent? (*the answers are shown in italics – more discussion is given in the 'Back up' notes below*).

- Scrape fragments off the candle (or grate them off using a cheese grater) – *erosion*
- Allow the pieces to fall down onto a piece of paper – *transportation*
- The pieces build up on the piece of paper – *deposition*
- Press down on the pile of candle fragments with the palm of your hand, saying that this

would happen to the sediments at the bottom as more sediments pile up on top – *compaction*

- Holding your hands vertical, move them together to compress the candle fragments into a ridge of wax – *metamorphism*
- Warm the candle with a match and point out the liquid wax – *melting*
- Let the liquid wax fall onto paper and solidify – *“crystallisation”*
- Ask which rock cycle processes this simple model can't demonstrate – *weathering, cementation, rising, extrusion, uplift*.

The back up

Title: The rock cycle in wax

Subtitle: Using a candle to demonstrate the rock cycle processes

Topic: A candle is used to demonstrate several rock cycle processes, and is effective in consolidating understanding of the rock cycle at the end of a lesson.

Age range of pupils: 11 – 16 years

Time needed to complete activity: 10 mins.

Pupil learning outcomes: Pupils can:

- describe the major rock cycle processes;
- explain how they are linked together through the rock cycle;

- link simple practical demonstrations to an abstract model.

Context:

In this activity, to consolidate understanding of the abstract and potentially challenging concept of the rock cycle, different rock cycle processes are demonstrated using a candle. Further notes on the processes follow:

- *weathering* is the break up or break down of rocks in place (*in situ*) in which no solid material is moved away, by chemical, physical or biological activity - it cannot be demonstrated using the candle;
- *erosion* is the removal of material by the action of gravity, water, wind or ice – the candle demonstrates removal of wax fragments by physical activity (abrasion) and their falling away through gravity;

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- *transportation* is the movement of fragments by gravity, water, wind or ice until they are deposited – the candle demonstration shows transportation downwards by gravity;
- *deposition* is the laying down of material – shown here by the build up of wax fragments;
- *compaction* is the compression of sediments by the weight of the deposited material above; compression alone can cause muds to become mudstones – it is shown here using the palm of the hand;
- *cementation* is the growth of small crystals of natural cement in the pore spaces of the sediment grains, cementing them together; cementation can cause sands to become sandstones, calcium carbonate fragments to become limestones, etc. – it cannot be shown using the candle demonstration;
- *metamorphism* is the change of sedimentary rocks (or igneous rocks) into metamorphic rocks by heat and increased pressure during mountain building episodes – it usually involves lateral compression, demonstrated here by making a ridge of wax in which the wax fragments are aligned at right angles to the pressure (as in metamorphism) and the 'rock' becomes less porous and 'harder' (Note: small scale metamorphism mainly by heat occurs near hot igneous bodies – this type of metamorphism cannot be shown by the candle);
- *melting* of a rock to magma (through either partial or total melting) happens when rocks become hot enough – shown here by heating the wax with a match;
- *rising* of hot magma occurs because it is less dense than the surrounding rock – not shown by the candle;
- *crystallisation* occurs when a magma cools and solidifies – shown by the wax solidifying here, although candle wax doesn't strictly crystallise, it just solidifies;
- *extrusion* occurs when magma reaches the surface, either as lava flows or explosively as bombs and ash;
- *uplift* is the pushing upward of great masses of rock, usually during mountain-building episodes; as the overlying rock is eroded

away, deeper and deeper layers are exposed.

Following up the activity:

Ask pupils how some of the rock cycle processes that cannot be demonstrated using a candle, could be demonstrated in other ways. Some can be shown by the Earthlearningidea 'Wax volcano'. Also ask pupils what energy sources drive the rock cycle processes – most of the external processes are driven by solar energy, largely through the water cycle, whereas most internal processes are driven by the Earth's energy (largely from radioactive decay) through plate tectonic processes.

Underlying principles:

- gravitational effects causing erosion, transportation and deposition;
- lateral forces causing compression and changing of a material;
- change of state by melting and solidifying.

Thinking skill development:

Picturing the rock cycle is a constructional activity and applying understanding of the rock cycle processes to a series of simple demonstrations involves bridging. Cognitive conflict emerges when pupils are asked which rock cycle processes the candle cannot demonstrate.

Resource list:

- candle
- knife or other metal object to scrape off wax fragments (or a cheese grater)
- piece of paper
- matches

Useful links: See the Earth Science Education Unit's 'The dynamic rock cycle' workshop booklet at: http://www.earthscienceeducation.com/workshops/worksheets/dynamic_rock_cycle.PDF for a range of other simple ways to demonstrate rock cycle processes.

Source: Activity devised by Chris King of the Earthlearningidea team.

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