OFFLINE ACTIVITY · YEAR 8 SCIENCE · AC9S8U04

Crayon rock cycle.

About 50 minutes
Pairs or groups of three

Sedimentary layers pressed together | **Metamorphic** warmed and squeezed, not melted | **Igneous** melted, then cooled

Use wax crayon shavings to model how sedimentary, metamorphic and igneous rocks form. Then compare your model with the real rock cycle, and decide where the model works and where it does not.

Equipment for each group

- 3 or 4 old wax crayons in different colours, papers removed
- A pencil sharpener or a plastic knife
- 4 squares of aluminium foil, about 20 cm by 20 cm
- A heavy book or a block of wood
- A hand lens, if you have one
- For the adult only: a heatproof bowl, hot water from a kettle, tongs

Safety

- Hot water and melted wax can burn. Only an adult handles the hot water and does Part C.
- Never heat crayons over a flame, on a stove or in a microwave. Hot wax can catch fire.
- Shave crayons slowly, cutting away from your fingers.
- Let melted wax cool completely before you touch it. Do not pour wax down a sink.
- Wash your hands when you finish.

Part A. Sedimentary rock

1. Shave each crayon into small flakes. Keep each colour in its own pile. *Your flakes are sediment. Shaving models weathering, which breaks rock into small pieces.*
2. Carry each pile over to a square of foil. *Moving the flakes models erosion.*
3. Sprinkle one colour in a thin, even layer in the middle of the foil. Add a second colour on top, then a third. *This models deposition, where sediment settles in layers.*
4. Fold the foil over the layers. Press down firmly with your hands, then stand the heavy book on top for one minute. *This models compaction.*
5. Unwrap the foil. Look at the edge of your rock with the hand lens and record what you see.

Part B. Metamorphic rock

6. Wrap your sedimentary rock in foil again. Hold the packet between your hands for three minutes to warm it.
7. Put the packet on the bench, lay the heavy book on top and press down on the book with both hands for 30 seconds. *Warmth and pressure together model metamorphism. The wax should soften but not melt.*
8. Unwrap it and record what has changed. Look for layers that are thinner, bent or wavy.

Part C. Igneous rock ADULT ONLY

9. The adult folds a square of foil into a small boat and puts in a few flakes of each colour, or a piece of your metamorphic rock.
10. The adult pours hot water from the kettle into the heatproof bowl and floats the boat on it until the wax has completely melted. *This models melting into magma.*
11. The adult lifts the boat out with tongs and leaves it on a heatproof surface to cool for at least 10 minutes. *This models magma cooling into igneous rock.*
12. When the wax is cold and hard, record how it looks compared with your other two rocks.

Record sheet

ROCK TYPE	WHAT YOU DID	WHAT IT LOOKS LIKE	REAL PROCESS IT MODELS
Sedimentary			
Metamorphic			
Igneous			

Questions

1. Which steps of the model stood for weathering, erosion, deposition and compaction?

2. In the model, each change took a few minutes. Use the lesson's table to write how long each real process usually takes: compaction and cementation, heat and pressure, and the cooling of magma underground.

3. Your model went right around the rock cycle in about 30 minutes. If each second of the model stood for 10,000 years, how long would 30 minutes stand for? Show your working.

4. Give two ways the crayon model is not like real rock.

5. Your Part A rock has coloured layers. Which real sedimentary rock does it look most like, and what real feature do the layers stand for?

6. The rock cycle has no start or finish. Describe a path through the cycle that turns igneous rock into metamorphic rock.

FOR THE TEACHER · NOT FOR STUDENTS

Notes and answers

Running the activity

- Crayon wax is mostly paraffin and melts at about 50 to 65 °C. Water from a kettle that has just boiled melts it in a minute or two. Rock melts at about 650 to 1200 °C.
- Parts A and B suit pairs at their desks. Part C works best as a demonstration, with one boat for each group.
- This activity goes with screens 3 to 5 and 9 of the online lesson. It complements the lesson and is not required to complete it.

Answers

- (1) Shaving models weathering, carrying the piles models erosion, sprinkling in layers models deposition, and pressing models compaction.
- (2) Compaction and cementation: thousands to millions of years. Heat and pressure: millions of years. Cooling of magma underground: thousands to millions of years.
- (3) 30 minutes is 1,800 seconds, and 1,800 × 10,000 years is 18 million years. The lesson's quickest route from granite to basalt takes about 13 million years.
- (4) Any two of: the wax melts at a far lower temperature than rock; the changes take minutes, not thousands to millions of years; pressing wax does not cement grains together with minerals; wax does not grow mineral crystals the way cooling magma does; the model has no uplift.
- (5) Layered sedimentary rock such as sandstone or shale. The coloured layers stand for layers of sediment that settled at different times.
- (6) For example: igneous rock is weathered and eroded, the sediment is deposited, buried, compacted and cemented into sedimentary rock, then heat and pressure change it into metamorphic rock.