

● ○ ○ EASY

5 – 10+ YRS

2 HRS
*plus drying
time overnight*

1 Find out how
traditional bricks
are made

2 Try making
mini recycled
material bricks

3 Learn different ways
scientists are making more
environmentally friendly bricks

INNOVATION IN CHEMISTRY

SUSTAINABLE BRICKS FROM RECYCLED MATERIALS



ENCOURAGING TOMORROW'S CHEMISTS TODAY
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INTRODUCTION

Many buildings are constructed from bricks. Bricks are made from clay, a type of rock that is made up of tiny particles.

The clay rock is crushed to a powder and mixed with sand and water until it becomes sticky and mouldable. The wet clay mixture is shaped in a mould, before drying. It is important to evaporate all the water so that the bricks don't crack or shatter later. At high temperatures water evaporates into steam very quickly, causing the bricks to crack. The dry bricks are now fired in a kiln to make them very hard and strong.

The building trade uses a lot of materials such as sand, cement and clay. All of these materials are finite, as they are mined from the ground and will eventually be used up. Many materials in the construction industry, such as rubble from building sites, are not easily recyclable. Is there a way to make the construction industry more environmentally friendly?



SAFETY



- Take care with natural materials that might harbour unknown microbes.
- An adult should operate the oven, and allow hot items to cool before handling.
- Always wash hands after handling.
- Always ask an adult for help using ovens.



DID YOU KNOW?

In 2018, the UK construction industry generated 67.8 million tonnes of waste. This is 62% of all the waste generated in the entire UK that year. Households only made up 12% of the total weight of waste. This equates to the weight of 6,712 Eiffel Towers EVERY year.



Reference: <https://www.tou Eiffel.paris/en/the-monument/key-figures>

<https://www.gov.uk/government/statistics/uk-waste-data/uk-statistics-on-waste> (Please see table 5 in section 7 and also figure 3 in section 9.1 of this report).

ACTIVITY

MAKING MINI BRICKS USING RECYCLED MATERIALS

INSTRUCTIONS

1. Split the clay into 4 equal pieces.
2. To the first piece, add a handful of pencil sharpenings (aim for a 1/3 pencil sharpenings to 2/3 clay mixture) and knead until your mixture is well mixed. Carefully push the dough into the ice cube tray moulds. Try to make 3 bricks. Bash out the 'brick shapes'. Cover a baking tray with kitchen foil, and place your bricks in a neat line on the covered tray. (Do not put the ice cube trays in the oven).
3. Using the second piece of clay, add a handful of wool strands. Mix well, shape in the ice cube tray, and add the bricks to the covered baking tray.
4. Using the third piece of clay, add a handful of compost. Mix well, shape in the ice cube tray, and add the bricks to the covered baking tray.
5. Take the fourth piece of clay and do not add anything. Shape into bricks using the ice cube tray and place on the covered baking tray.
6. Leave the bricks to dry overnight at room temperature.
7. Ask an adult to cook the bricks in the oven for 20 minutes at 100°C. Leave the bricks to cool for one hour until fully cooled before handling.
8. Try to break each of the different types of bricks apart with your hands. Place the bricks on a piece of newspaper and try asking an adult to stand on them to test how sturdy they are. Make sure to do this with shoes on. Which type of brick was the strongest? Can you think of other waste materials that could be added to clay to make more sustainable bricks?



YOU WILL NEED

- 500g pack of air-drying clay
- Recycled materials: pencil sharpenings, wool, a handful of soil/compost
- Ice cube tray, rectangular 'brick' shapes are best
- **Do not put the ice cube trays in the oven!**
- Baking tray
- Access to an oven
- Kitchen foil
- **Always ask an adult for help using ovens!**



WHAT'S HAPPENING?

Bricks made with fibrous materials like wool tend to be hardest and strongest, as they weave through the clay giving it texture and support. Scientists have been experimenting with making bricks out of different types of recycled materials mixed with clay such as: construction rubble, recycled glass, soil even sheep's wool to make the construction industry more environmentally friendly.

One example, is using mycelium fibres. Mycelium are the thin, thread-like root-like structure of fungi. They are also grown to make vegetarian meat substitutes. The fungal fibres grow around a frame of corn stalks or jelly. The 'mushroom bricks' are biodegradable, waterproof, fireproof and non-toxic. They also require very little energy to make as no kiln is required. They're light, but almost as strong as concrete blocks.

Reference:

<https://www.dezeen.com/2023/01/30/brick-alternatives-biomaterials-waste/>