

From crude oil to plastics and fibres

Grade 8 science (Year 9 · Class 8) · Lab

Name: _____ Date: _____ Class: _____

Plastics look alike, yet their densities differ widely. In this lab you find the mass and volume of five small plastic pieces, calculate their densities and predict which ones float, which links to how recycling plants sort plastics.

Level: Grade 8 science (Year 9 · Class 8) · **Curriculum:** MS-PS1-3

Aim

To measure the density of five plastics and use the values to predict which will float on water.

Equipment

- Five plastic pieces about 5 cm³ each, cut from clean items: milk bottle, drinks bottle, food tub, pipe offcut and a disposable cup
- A balance reading to 0.1 g
- A 25 mL measuring cylinder and a water bottle with a dropper
- Scissors or a craft knife used by an adult, paper towel and a pencil

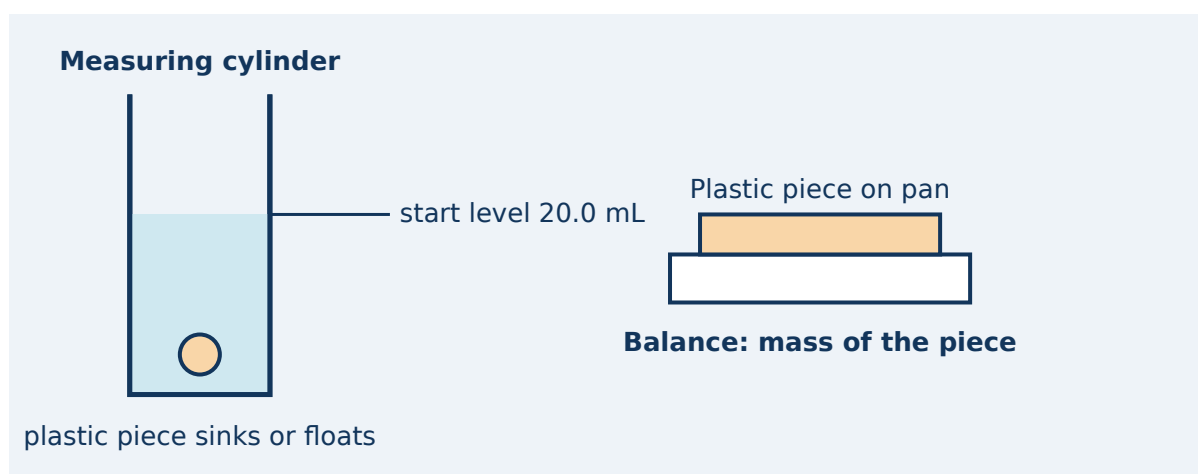
Safety

Safety

Cutting plastic can produce sharp edges, so an adult must cut the samples beforehand. Wear goggles. Do not heat the plastics, because some give off harmful fumes. Wipe up spilt water at once so nobody slips.

Method

1. Measure the mass of each plastic piece on the balance and record it.
2. Pour water into the cylinder to the 20.0 mL mark and record the reading.
3. Tilt the cylinder and slide in piece A so it is fully under the water. Tap the cylinder to dislodge air bubbles.
4. Read the new water level. The rise in level is the volume of the piece.
5. Remove the piece, refill to 20.0 mL and repeat for pieces B to E.
6. Drop each piece into a bowl of water and note whether it floats or sinks.



Set-up for the density lab.

Results

Sample data from a school lab (volume = end level minus start level).

Sample	Mass (g)	Start level (mL)	End level (mL)
A	4.9	20.0	25.1
B	6.9	20.0	25.0
C	4.5	20.0	25.0
D	7.7	20.0	25.5
E	5.3	20.0	25.1

Analysis questions

Question 1 Volumes

Calculate the volume of each piece in cm^3 ($1 \text{ mL} = 1 \text{ cm}^3$).

Question 2 Densities

Calculate the density of each piece in g/cm^3 to 2 decimal places.

Question 3 Prediction

Predict which pieces float in water and explain your prediction.

Question 4 Air bubbles

Explain how an air bubble stuck to a piece would change the calculated density.

Question 5 Uncertainty

Each level reading is uncertain by ± 0.5 mL. Calculate the greatest uncertainty in the volume of piece B as a percentage.

Question 6 PET and PVC

Explain why this lab cannot tell B and D apart with confidence.

Question 7 Improving the method

Suggest two ways to reduce the uncertainty in the volume.