

Demonstration Questions for Science Challenge

D1. A teacher wrote on the board with a permanent marker pen. The writing could not be wiped off with the board rubber or with a wet cloth. When the teacher wiped the board with a cloth soaked in hand sanitizer, the writing came off easily. Why do you think this was?

A: The hand sanitizer could turn the board white and cover the writing

B: The ink could dissolve in hand sanitizer but not in water

C: The hand sanitizer reacted with the cloth to make it better at cleaning things.

D: The teacher was playing a trick and only pretended to wipe the ink off the first time.

D2. A Year 10 student was studying a chemical reaction that was occurring inside a test tube. The time taken for some magnesium to dissolve in an acid was being measured. The first experiment was carried out at room temperature. The reaction also gives off bubbles of gas (hydrogen).

The second experiment used the same quantities of the same chemicals but the acid was cooled by holding the test tube upright in a bowl of iced water for one minute before the metal was added to it.

The student noticed that the metal took longer to dissolve in the second experiment. Why?

A: The acid would occupy less volume when it was cooled.

B: The gas made by the reaction gets stuck in the cold acid and can't escape, this stops the reaction from continuing.

C: Cold acid particles move around more slowly than warm acid particles so, when they are cold, every second, fewer acid particles will touch the surface of the metal.

D: The reaction needs to give out heat energy, making the chemicals cold makes this more difficult.

D3. The orange pigment from a carrot will dissolve in white spirit (paint brush cleaner) but not in water.

The purple pigment in beetroot will dissolve in water but not in white spirit.

White spirit and water do not mix.

White spirit floats on top of water.

You shake up grated carrot, grated beetroot, white spirit and water. Next filter the mixture into a clean beaker. What would you observe after the mixture had been left to stand for an hour?

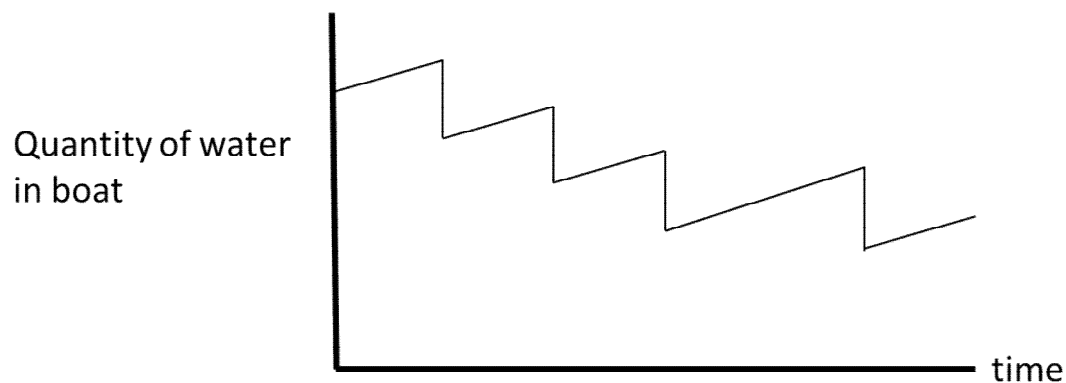
A: Purple liquid floating on top of orange liquid

B: A purple, smelly mess.

C: Orange liquid floating on top of purple liquid.

D: Purple liquid with orange blobs floating in it.

D4. This graph shows how the quantity of water in a boat changed as a person removed it.



What is most likely to be happening?

A: The water is being removed with an electric pump

B: The water is being scooped out with a bucket

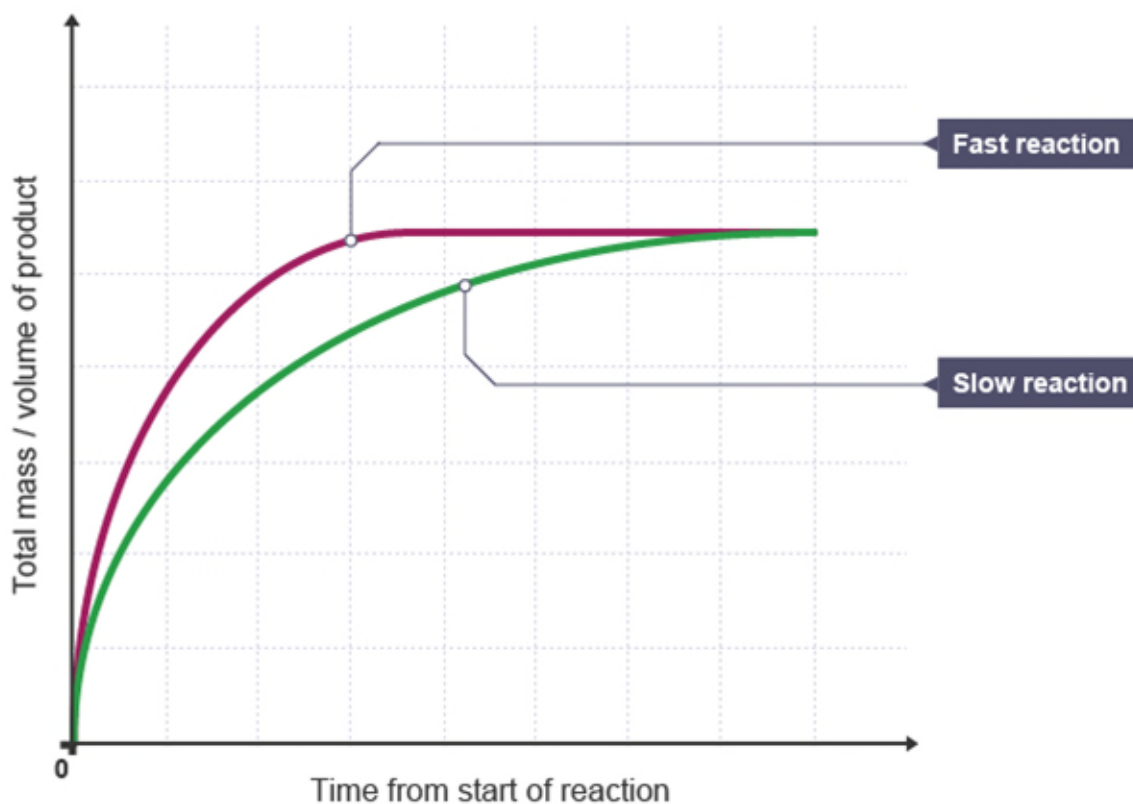
C: The boat is filling up with water

D: The water is being scooped out with a bucket but more water is leaking into the boat at the same time

Rates of reaction

A student added magnesium to sulfuric acid and measured the volume of gas produced over time. The data were plotted.

The equation for the reaction was: $\text{Mg}_{(s)} + \text{H}_2\text{SO}_{4(aq)} \rightarrow \text{MgSO}_{4(aq)} + \text{H}_{2(g)}$



D5. Which piece of equipment was not essential to obtain these results?

- A: stop watch
- B: Hydrogen gas**
- C: Magnesium
- D: scales for weighing the chemicals

D6. Look at the graph. Where is the reaction fastest?

- A: At the very beginning**
- B: Right at the end
- C: Near the beginning but it needs a moment to get started
- D: When the line of the graph becomes horizontal

D7. Look at the graph. Describe where is the reaction has finished.

A: At the end of the science lesson

B: Right at the end

C: Near the beginning but it needs a moment to get started

D: When the line of the graph becomes horizontal

D8. The student repeated the experiment having changed a variable to get a second set of results. Suggest two variables that may have been changed to learn something useful but keep the experiment a fair test.

1: the mass of the metal used

2: the temperature of the acid

3: how dilute (watered down) the acid was

4: to use a computer data-logger for more accurate measurements

A: 1 and 2

B: 2 and 3

C: 3 and 4

D: 2 and 4