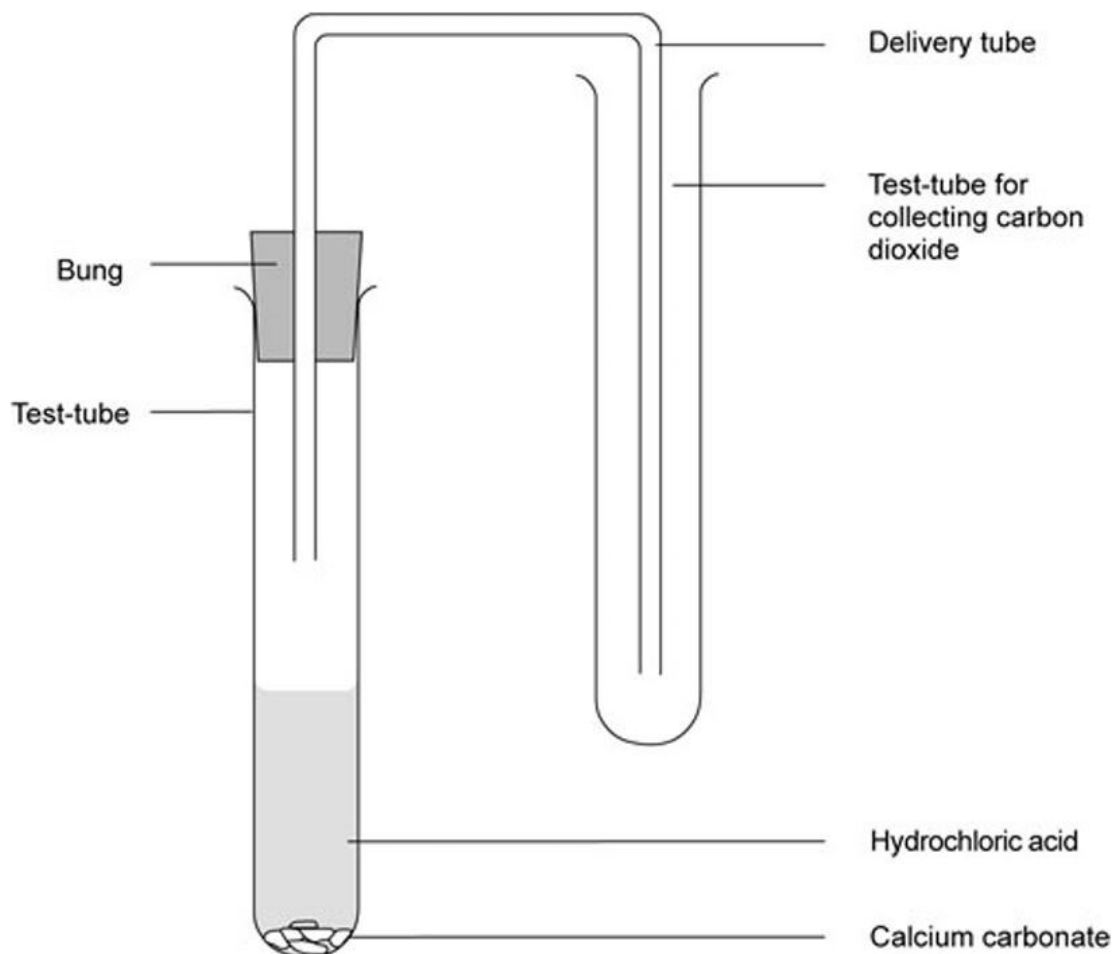


Particles in motion? – student sheet

Introduction

These two activities suggest that particles in a gas are in motion.



Equipment

Apparatus

- Eye protection
- Test tubes, x3
- Cork
- Delivery tube and bung

Chemicals

- Limewater 0.02 mol dm^{-3}
- Calcium carbonate
- Hydrochloric acid 0.5 mol dm^{-3}

Health, safety and technical notes

- Read our standard health and safety guidance here <https://rsc.li/3F7DnV7>
- Wear eye protection, if desired.
- Hydrochloric acid is an eye irritant, see CLEAPSS Hazcard [HC057](#)

Procedure

1. Set up the apparatus as shown in the diagram.
2. Put a spatula measure of calcium carbonate into the first test-tube.
3. Add 10 cm³ of hydrochloric acid and quickly replace the bung and delivery tube. Ensure the delivery tube reaches almost to the bottom of the second test-tube.
4. Allow the gas to pass into the second test-tube for about one minute, then remove the delivery tube and cork the test-tube.
5. Hold the test-tube upside down over a similar test-tube containing air.
6. Remove the cork and place the tubes mouth-to-mouth.
7. After 5 min, cork both tubes and test the contents for carbon dioxide (swirl a little limewater round in the test-tube). Write down what happens in both tubes.
8. Repeat this experiment but this time at step 5 hold the test-tube of air upside down over a test-tube of carbon dioxide.

Questions

1. Which of the four test-tubes contained carbon dioxide at the end of the experiment?
2. Is air or carbon dioxide more dense?
3. Does this experiment support the idea that the particles of a gas are in motion? Give your reasons.