B6 · Why gases behave this way: kinetic molecular theory; ideal and real gases · Practice key

This is the worked key. Every practice question is worked step by step.

Worked examples

Read these first. There is one for each kind of question in this lesson.

Example 1 · Explain what a gas does, using the theory

The hole of a bike pump is blocked and the handle is pushed in. Use the kinetic molecular theory to explain why the pressure rises.

1. Idea 2 says the particles move all the time, so they keep hitting the walls.
2. In the smaller space, the particles have less far to go between walls.
3. So each particle hits a wall more often.
4. More hits each second means more pressure.

Answer: In the smaller space the particles hit the walls more often, so the pressure is higher.

Example 2 · Decide whether a real gas acts like an ideal gas

Nitrogen gas is at room temperature and normal air pressure. Does it act almost like an ideal gas? Explain.

1. Real particles take up a little space and attract each other a little.
2. At normal temperatures and pressures these effects are tiny.
3. So nitrogen acts almost like an ideal gas.

Answer: Yes. At normal temperature and pressure a real gas acts almost like an ideal gas.

Practice

Questions 1 to 4 are easy. Questions 5 to 8 are medium. Questions 9 and 10 are harder.

EASY

1. How do gas particles move, according to the kinetic molecular theory?

1. They move all the time.
2. They move in straight lines, until they hit something.

EASY

2. What does the word "kinetic" mean? Say why it fits the theory.

1. "Kinetic" means moving.
2. The theory is about particles that move all the time.

EASY

3. A gas is heated. Which idea of the theory tells you what happens to its particles? Say what happens.

1. Idea 3 says hotter particles move faster.
2. So the particles speed up.

EASY

4. Name one way the particles of an ideal gas differ from the particles of a real gas.

1. Ideal gas particles have no size of their own. Real particles have some size.
2. Ideal gas particles also do not attract each other. Real particles attract a little.

MEDIUM

5. Explain why a gas fills its whole container.

1. The particles move all the time.
2. Nothing holds them in one place, so they spread through the whole container.

MEDIUM

6. A balloon is warmed in the sun and gets bigger. Use the theory to explain why.

1. The particles move faster.
2. Faster particles hit the skin harder and more often.
3. The skin can move, so it is pushed out. The volume gets bigger.

MEDIUM

7. Explain why a gas can be squeezed far more than a liquid.

1. Gas particles are far apart. Most of a gas is empty space.
2. In a liquid the particles are already close together.

MEDIUM

8. A real gas is put under very high pressure. Explain why it stops acting like an ideal gas.

1. At very high pressure the particles are crowded.
2. So their own size matters.
3. Ideal gas particles have no size, so the real gas no longer matches.

HARDER

9. A propane tank holds liquid propane. Use what you know about real gases to explain how a gas can turn into a liquid.

1. Real gas particles attract each other a little.
2. When the particles are crowded or slow, the attractions pull them together.
3. Then the gas turns into a liquid.

HARDER

10. A sealed glass jar of air is put in a freezer. The jar cannot change size. Use the theory to predict what happens to the pressure. Explain.

1. The particles move more slowly.
2. They hit the walls less hard and less often.
3. So the pressure goes down.