THE STRIVING

MUSLIM ACADEMY

Islamic and Academic Education

YEARS 7 TO 9 · SCIENCE

Physical changes and the particle model

The changes of state in both directions, what the particle model explains, and physical against chemical change.

WHAT IS INSIDE

- Changes of state, named both ways
- What the particle model explains
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1 sets · a hint on every question

Written for a parent teaching at home. No training assumed, and nothing else to buy.

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What the particle model explains

Read this, then answer the questions on it.



WHAT THE PARTICLE MODEL EXPLAINS

Heat a solid and its particles vibrate more. Enough heat and they break out of their fixed places, which is melting. More, and they escape the liquid altogether, which is boiling.

Chemistry 10.1 notes that many gases can be liquefied by compressing them, if the temperature is not too high, as well as by cooling. So the simple picture of temperature alone is incomplete: pressure matters too, within limits.

During a change of state the temperature stops rising even though heat is still going in: there is no temperature change until the phase change is complete. The energy goes into overcoming the forces between the particles rather than into making them move faster, and that flat part of a heating graph is the change of state happening.

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Physical against chemical change

Read this, then answer the questions on it.



PHYSICAL AGAINST CHEMICAL CHANGE

A physical change alters the form of a substance and not what it is. A chemical change produces matter that differs from what went in.

The useful test is whether a new substance has appeared. Melting ice, dissolving sugar and tearing paper are physical. Burning paper, cooking an egg and iron rusting are chemical.

So ask whether something new exists, rather than whether you can undo it. The source lists wax melting and sugar dissolving in coffee as physical changes, and all forms of burning, food being cooked and iron rusting as chemical ones.

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How each one is answered

Mark it together. Where a question asks for a list, the order does not matter.



CHANGES OF STATE AND THE PARTICLE MODEL

1. Name the change in each direction between solid and liquid, and between liquid and gas.

1. Solid to liquid is melting; liquid to solid is freezing.
2. Liquid to gas is boiling; gas to liquid is condensing.

Answer: **melting and freezing, boiling and condensing**

2. Give the difference between boiling and evaporating.

1. Boiling happens throughout the liquid at its boiling point.
2. Evaporating happens at the surface, below the boiling point.

Answer: **boiling is throughout the liquid at the boiling point; evaporating is at the surface below it**

3. Why can a melting point be used to identify a substance?

1. Every specimen of a pure substance has the same physical properties.
2. Its melting point is one of those properties, so the same substance always melts at the same temperature.

Answer: **because every specimen of a pure substance has the same melting point**

4. Name one way other than cooling to turn a gas into a liquid, and give the condition on it.

1. Many gases can be liquefied by compressing them.
2. The source adds the condition: if the temperature is not too high.

Answer: **compressing it, if the temperature is not too high**

5. During melting the temperature stops rising even though heat is still going in. Explain where the energy goes.

1. The heat is being used to separate the particles from their fixed positions.
2. Energy spent separating particles does not raise their speed, and temperature measures their movement.
3. So the graph goes flat until the change of state is finished.

Answer: **into separating the particles rather than speeding them up, so the temperature stays level until the change is done**

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SAMPLE PAGES

You have read a few pages. The pack is longer.

What you are holding is a short sample, taken from different parts of the pack so that you can see how a week is planned and what a child is actually asked to do, before you decide.

The complete pack, and the rest of the academic materials, are on our website: schemes of work for a parent teaching at home, and practice packs for the skills children get stuck on.

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