

**GRAYS TUITION CENTRE – Online Tutoring**

**WEEK: 4**

**Week Beginning: (11/01/2021)**

**Subject: SCIENCE**

**Year: 8**

**Lesson Objective:**

- Teach Topic 1: Physical Changes
- Topic 2: Atoms and Elements

**Keywords/ Concepts**

- Elements, Periodic Table
- Compound and Chemical Reactions

**Class Questions**

1. When a material changes state what happens to the arrangement and energy of the particles?
2. When a solid turns to a gas is heat supplied or not?
3. What happens to the particles when a liquid turns to a gas?
4. Define sublimation, condensation and evaporation.
5. Draw a cooling curve
6. What is the definition of atoms?
7. What is an element?
8. Where are elements arranged?
9. Give the element for the following symbols:
  - a. C
  - b. Zn
  - c. Mg
  - d. Al
10. Give the symbol for the following elements?
  - a. Aluminium
  - b. Radon
  - c. Argon
  - d. Helium
11. What are groups and what are periods?
12. Which elements have similar properties? 13. Which elements react violently with water?

## Homework Additional Notes

Worksheets attached

All lessons is split into 3 sections:

- a. Topic 1 + questions
- b. Topic 2 + questions
- c. Quiz + Recap

Make sure students mark their homework with the answers provided

Answers for Week 6 Pg 71

- Q1
- a) T
  - b) F
  - c) F
  - d) T
  - e) T
  - f) T
  - g) T

Q2

	Particles are close together	Particles are held in fixed positions	Particles are moving or vibrating
Solid	✓	✓	✓
Liquid	✓		✓
Gas			✓

Q3

A — X, B — Z, C — Y

Answers for Week 6 Pg 71

- Q4 E.g. the forces between particles in solids are very strong, they hold the particles very close together and stop the particles being able to move much. In liquids the forces between the particles are slightly weaker. The particles are held close together, but they can move past each other. In gases the forces between particles are very weak, so the particles are far apart.
- Q5 a) Yes  
b) No
- Q6 a) E.g. particles are close together but able to move past each other. They're constantly moving in all directions.  
b) E.g. constant volume, ability to flow, not easily compressed.
- Q7 In a solid, the particles are held very **closely** together in **fixed** positions, although they do **vibrate** to and fro a little. The particles don't **move** from their positions, so all solids keep a **fixed** shape and **volume** and can't **flow** like liquids. Solids can't easily be **compressed** because the particles are already packed very **closely** together. Solids are usually **dense** as there are lots of particles in a **small** volume.

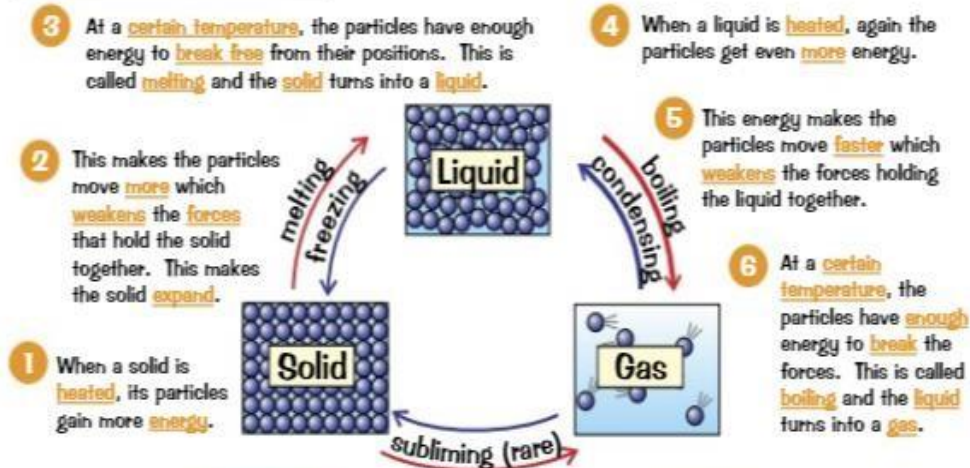
- Q8** The following should be ticked:  
Particles move fast.  
Particles collide with the container.  
No definite shape.  
Very low density.
- Q9** E.g. the pressure will increase. When the temperature is increased, the particles move faster. This means that they hit the walls of the container harder and more often. Both of these things increase the pressure.
- Q10** E.g. if you reduce the volume of a gas the pressure increases. This is because when the particles are squashed up into a smaller space they'll hit the walls more often.
- Q11 a)** E.g. the particles want to spread out. They move from an area of high concentration (near the bucket) to an area of low concentration (the next room).
- b)** E.g. he is wrong. Diffusion is slow because the particles from whatever is making a smell keep bumping into air particles. This stops them moving forward and sends them off in different directions.

## Physical Changes

Physical changes don't change the particles — just their arrangement or their energy.

### Changes of State

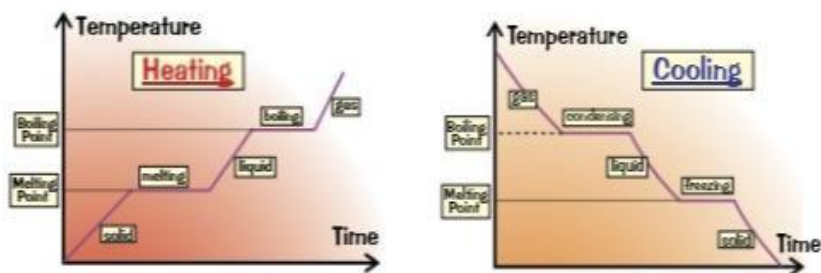
— i.e. changing from one state of matter to another.



A change of state doesn't involve a change in mass (see page 74), only a change in energy.

### Heating and Cooling Curves have Flat Bits

Heating and cooling curves show the energy changes that happen when a substance changes state:



- 1) When a substance is melting or boiling, all the energy supplied from heating is used to weaken the forces between particles rather than raising the temperature — hence the flat bits on the heating graph.
- 2) When a substance is cooled, the cooling graph will show flat bits at the condensing and freezing points.
- 3) This is because the forces between particles get stronger when a gas condenses or when a liquid freezes — and energy is given out. This means that the temperature doesn't go down until all the substance has changed state.

### Phew — another page of jostling snooker balls...

So the reason your ice cream melts is because the little snooker balls of ice cream take in energy, which means they can break free from their positions and become a liquid. Not that my ice creams last that long.

## Atoms and Elements

If you've ever wondered what **everything is made of**, then the simple answer is **atoms**.

### You Need to Know About **Atoms**...

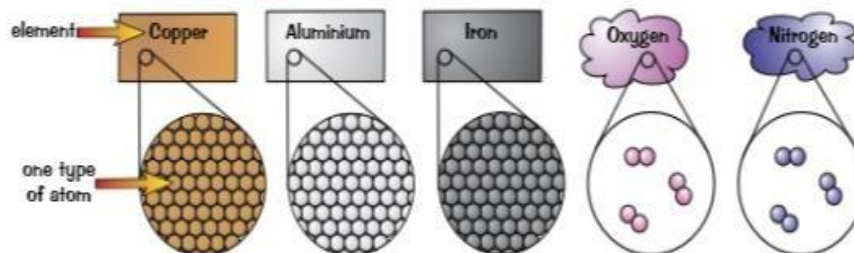
- 1) Atoms are a type of **tiny, tiny, particle**.
- 2) They're so small that you **can't see them directly**.  
So for a long time, no one knew much about them.
- 3) **Dalton** was the first modern scientist to try to **explain** things about atoms.  
According to the **Dalton model**:

- All **matter** is **made up of atoms**.
- There are **different types of atom**.
- Each **element** (see below) contains a **different type**.

Scientists now know a lot more about atoms — but luckily, this is all you need to learn for Key Stage 3.

### ...and **Elements**

- 1) An **element** is a substance that contains **only one type of atom**.
- 2) Quite a lot of **everyday substances** are elements:



- 3) All of these elements have **different properties**.  
For example, **copper** is a **soft, bendy metal**. **Oxygen** is a **colourless gas**.

### All Elements Have a **Name** and a **Symbol**

- 1) There are over **100 different elements** and writing their names out each time you wanted to mention one would take ages.
- 2) So each element has a **symbol** — usually of **one or two letters**.

#### Examples:

**Oxygen** has the symbol **O**.  
**Carbon** has the symbol **C**.

**Helium** has the symbol **He**.  
**Iron** has the symbol **Fe**.

Some symbols make sense (like O for oxygen) but others are based on Latin, so are a bit weird — like Fe for iron.



- 3) You can see the **symbol** for each element on the **periodic table** (see next page).

### It's elemental, my dear Watson...

**Atoms** — you can't see them, but these tiny little footballs are absolutely **everywhere**.  
Understanding **atoms** and **elements** is pretty **fundamental** to the whole of chemistry — so make absolutely certain **you've learnt this page** before you even think about moving on to the next one.



## Atoms and Elements

**Q1** Why didn't scientists know much about atoms for a long time?

.....  
 .....

**Q2** Fill in the blanks in these sentences about the discovery of the atom using the words on the right.

Dalton was the first scientist to try and explain things about .....  
 He said that all ..... was made up of atoms. He also said that  
 there were ..... kinds of atom, and that each .....  
 contained a different type of atom.

element  
 matter  
 atoms  
 different

**Q3** Write agree or disagree for each of the statements below.

- a) Elements are substances that contain only **one type** of atom. ....
- b) An element can be **split up** into simpler parts by chemical methods. ....
- c) All **matter** on Earth is made up of elements. ....
- d) There are over **100** different elements. ....
- e) Each element has a **name** and a shorthand **symbol**. ....
- f) Each element contains at least **two** atoms joined up. ....
- g) The symbol for an element is always the **first letter** of its name. ....

**Q4** Put a tick (✓) next to all the things below that are elements.

Carbon

Nitrogen

Air

Carbon dioxide

Uranium

Steel

My pet hamster

Helium



Section 5 — Classifying Materials



## Atoms and Elements

**Q6** Give the names of the elements represented by the following symbols:

- |             |             |
|-------------|-------------|
| a) C .....  | d) Cu ..... |
| b) Cl ..... | e) Na ..... |
| c) Ca ..... | f) F .....  |

**Q7** Give the names of those elements whose symbols appear in this shop sign.

.....

.....

.....

.....



**Q8** Here are pictures of six elements. Write their names in the spaces below.



A — .....

B — .....

C — .....

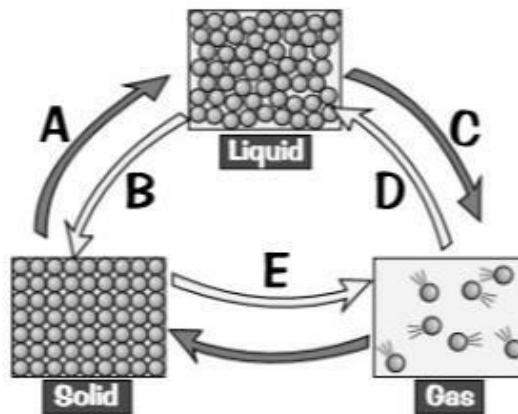
D — .....

E — .....

F — .....

### Physical Changes

Q1 This question is about changes of state that a substance experiences, as displayed in the diagram below.



a) A, B, C, D and E represent **changes** from one state to another. Name each of these changes.

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

b) What is happening to the particles in the substance when change C happens?

.....

.....

.....

c) These sentences are **wrong**. Rewrite them so that they are correct.

i) When the state of a substance changes, the energy of the particles doesn't change.

.....

ii) A change of state involves a change in mass.

.....

iii) Condensing is the opposite of melting.

.....



## Physical Changes

**Q2** Which state must be supplied with the most energy to turn it into a gas? Explain your answer.

.....

.....

.....

**Q3** When energy is supplied to a solid, what happens to the particles within it? Answer in terms of the energies of the particles and how they are moving.

.....

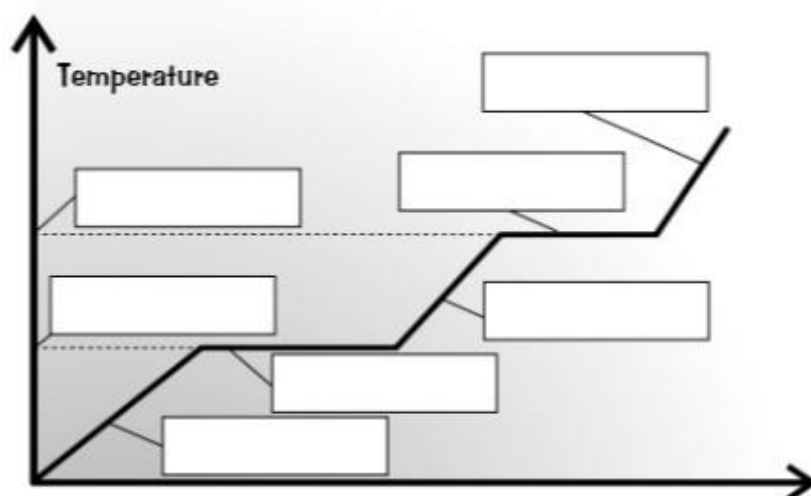
.....

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**Q4** Fill in the blanks on the heating curve using the words given in the word box.

**WORD BOX:**

boiling point	melting point	solid
melting	liquid	boiling
		gas



Section 5 — Classifying Materials