



KS3 Science

Changes of State

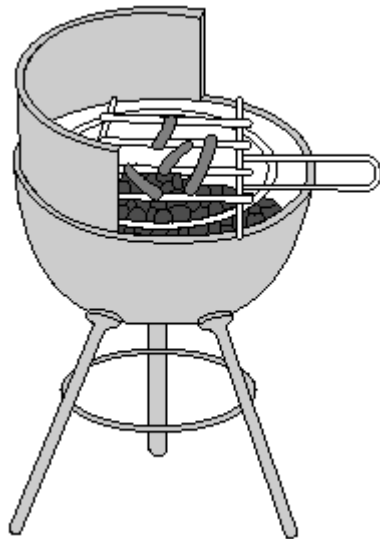
Question Paper

Time available: 35 minutes

Marks available: 51 marks

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1. Susie cooked sausages on a barbecue.



(a) Fat and water in the sausages changed state.

Draw **one** line from each statement to the correct change of state.
Draw only **two** lines.

statement

change of state

fat melted

water evaporated

liquid to gas

gas to liquid

liquid to solid

solid to liquid

solid to gas

2 marks

(b) Susie uses charcoal as the fuel for the barbecue.

(i) Which statement is true about all fuels?
Tick the correct box.

All fuels are sources of energy.

All fuels are black.

All fuels are made from wood.

All fuels are solid.

1 mark

(ii) Which gas in the air is needed for fuels to burn?
Tick the correct box.

water vapour

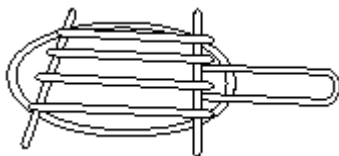
oxygen

nitrogen

carbon dioxide

1 mark

(c) The metal grill of the barbecue is made of steel.



Six properties of steel are given below.

Which properties are needed for the metal grill?
Tick **two** correct boxes.

It conducts electricity.

It is rigid.

It has a very high melting point.

It is magnetic.

It is shiny.

It rusts.

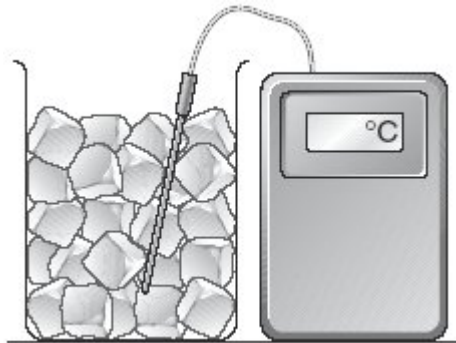
2 marks
maximum 6 marks

- 2.** (a) Draw a line from each change of state to the correct name.
Draw only **four** lines.

change of state	name
solid to liquid	evaporating
liquid to gas	melting
gas to liquid	condensing
liquid to solid	freezing

3 marks

- (b) Kate made some ice cubes from pure water.
She used a sensor to measure the temperature of the ice.



What temperature will the sensor show when the ice is melting?

..... °C

1 mark

- (c) Kate made some more ice cubes from salt solutions. She used a different amount of salt in each ice cube.

The table shows the temperature at which the ice cubes melted.

mass of salt in each ice cube (g)	temperature ice cube melted (°C)
5	-4
10	-8
15	-11
20	-15

Look at the table above.

As the mass of salt increased, what happened to the temperature at which the ice cube melted?

.....

1 mark

- (d) In very cold weather a mixture of salt and sand is spread on roads.

Why are salt **and** sand used?

Tick the **two** correct boxes.

Salt makes the roads white.

Sand dissolves in water.

Salt makes water freeze.

Sand increases friction between car tyres and the road.

Salt makes ice melt.

Sand makes water freeze.

2 marks
maximum 7 marks

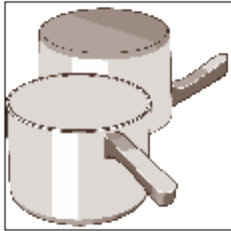
3.

(a) The drawings below show three objects made from copper.

Draw a line from each object to the reason for using copper for that object.
Draw only **three** lines.

object made from copper

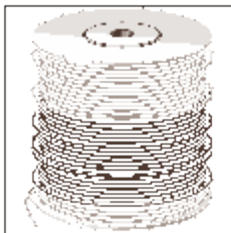
reason for using copper



base of a saucepan



coin



wires in a cable

It does **not** rust.

It is a good conductor of electricity.

It is a good conductor of heat.

It is **not** magnetic.

3 marks

(b) Brass is a mixture of copper and zinc. Some keys are made from brass



Why is brass more suitable than copper for a **key**?

Tick the **two** correct boxes.

Brass does **not** bend as easily as copper.

Brass is a paler colour than copper.

Brass is harder than copper.

Brass is **not** as shiny as copper.

Brass is **not** such a good conductor of electricity as copper.

Brass is **not** such a good conductor of heat as copper.

2 marks

(c) Zinc melts at 420°C.

Copper melts at 1085°C.

A scientist heated a mixture of pieces of zinc and pieces of copper to 600°C in a dish.

What would be in the dish at 600°C?

liquid zinc and liquid copper

liquid zinc and solid copper

solid zinc and liquid copper

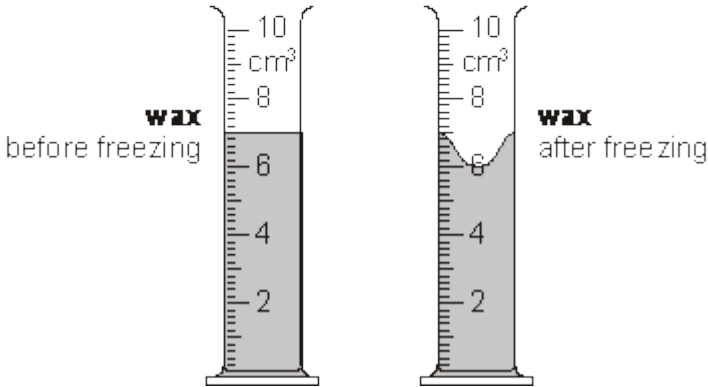
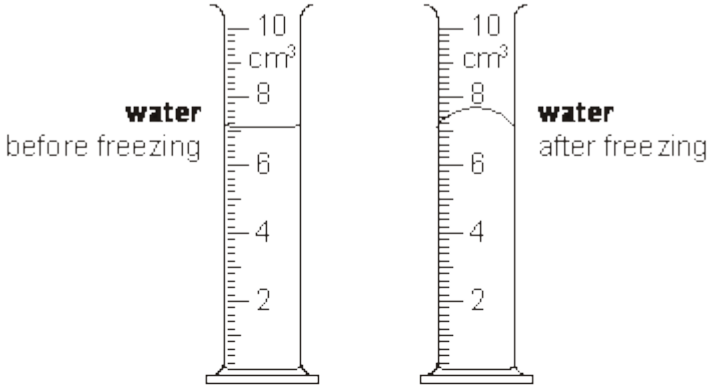
solid zinc and solid copper

1 mark
maximum 6 marks

4.

Meera poured 7 cm³ of water into a measuring cylinder.

She poured 7 cm³ of melted wax into another measuring cylinder. She put both measuring cylinders into a freezer for 24 hours.



(a) Look at the measuring cylinders. What happened to the volume of the water and the wax after freezing?

the volume of water
the volume of wax

1 mark

(b) The measuring cylinders were taken out of the freezer and left in a room at 20°C.

- Frozen water melts at 0°C.
- Wax melts at 53°C.

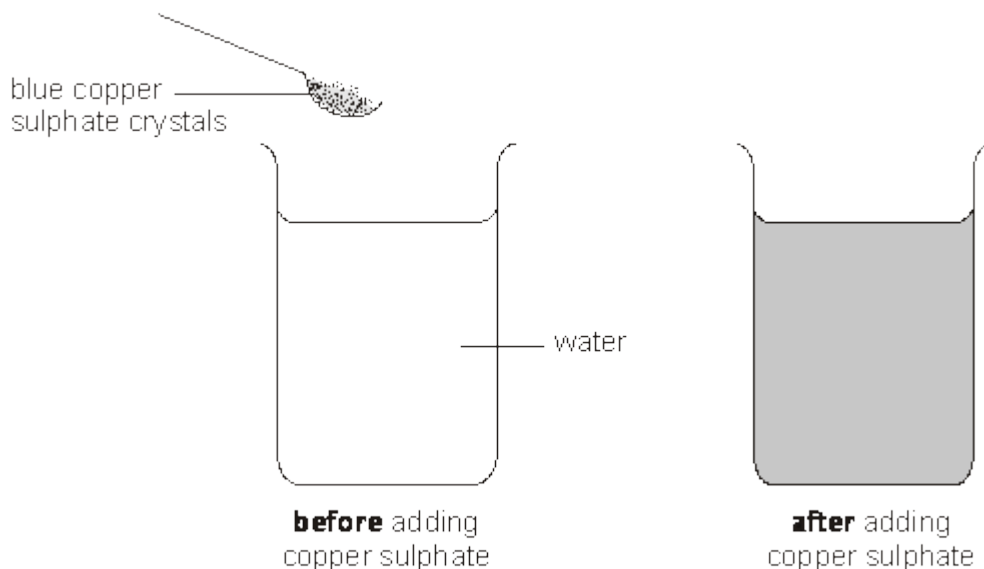
What would the physical state of each substance be at 20°C?

Choose from **gas** or **liquid** or **solid**.

water
wax

2 marks

- (c) Meera added blue copper sulphate crystals to some water in a beaker. The copper sulphate dissolved in the water.



- (i) Give **one** way Meera could see that the copper sulphate had dissolved in the water.

.....

1 mark

- (ii) Give **one** way that she could get the copper sulphate to dissolve more quickly.

.....

1 mark

- (d) Meera poured some of the copper sulphate solution into a dish. She left it in a warm room for a week.



A week later there was a blue solid but **no** liquid in the dish.

- (i) What happened to the water in the copper sulphate solution?

.....

1 mark

- (ii) What was the blue solid left in the dish?

.....

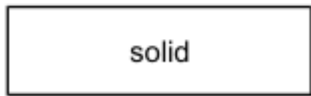
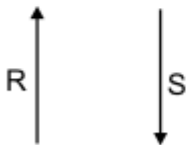
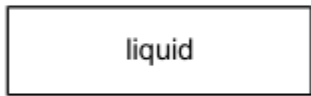
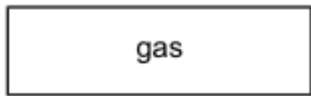
1 mark
maximum 7 marks

5.

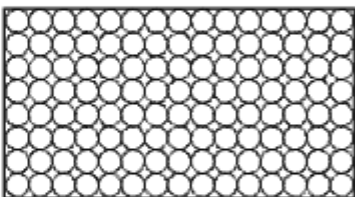
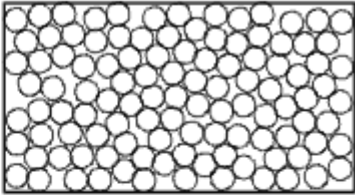
(a) Methane can be a gas, a liquid or a solid. In the diagram below, arrows P, Q, R and S represent changes of state.

The boxes on the right show the arrangement of particles of methane in the three different physical states. Each circle represents a particle of methane.

physical state of methane



arrangement of particles



(i) Draw a line from each physical state of methane to the arrangement of particles in that physical state. Draw only **three** lines.

1 mark

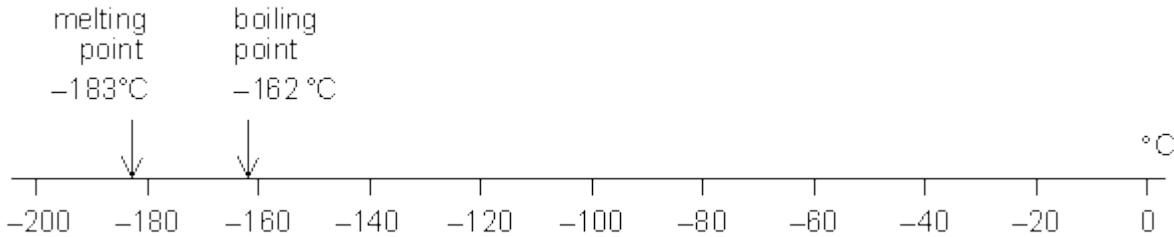
(ii) Arrows P, Q, R and S represent changes of state. Which arrow represents:

evaporation?

melting?

2 marks

(b) Methane is the main compound in natural gas. The scale below shows the melting point and the boiling point of methane.



Methane has three physical states: solid, liquid and gas.

(i) What is the physical state of methane at -170°C ?

.....

1 mark

(ii) The formula of methane is CH_4 . The symbols for the two elements in methane are C and H.

Give the names of these two elements.

element C

element H

2 marks

(iii) When methane burns, it reacts with oxygen.
One of the products is water, H_2O .

Give the name of the other product.

.....

1 mark

Maximum 7 marks

6.

(a) The table below shows the melting points of four metals.

metal	melting point, in $^{\circ}\text{C}$
gold	1064
mercury	-37
sodium	98
iron	1540

(i) Which metal in the table has the highest melting point?

.....

1 mark

(ii) Which metal in the table has the lowest melting point?

.....

1 mark

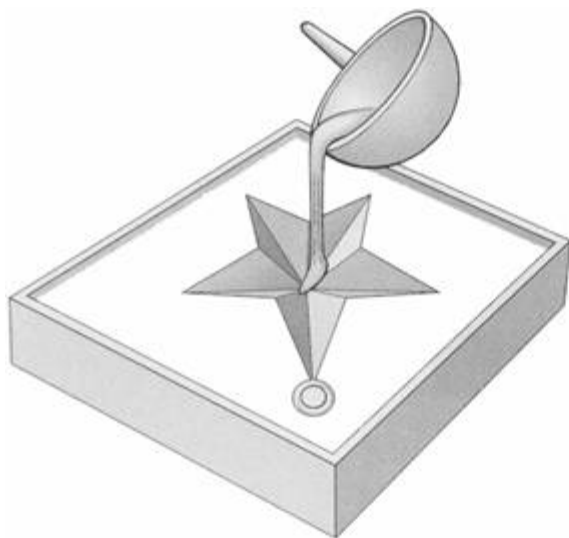
(b) Gold can be a **gas** or a **liquid** or a **solid**.

Choose from these words to fill the gaps below.

When gold is heated from room temperature to 1070°C, the gold changes from a to a

1 mark

(c) 5 g of gold is melted and **all** of it is poured into a mould to make a pendant as shown below.



melted gold is poured into a mould



What is the mass of the gold pendant?

..... g

1 mark

(d) The table below shows how the four metals react with oxygen when heated in air.

metal	reaction when heated in air
gold	no change
mercury	slowly forms a red powder
sodium	bursts into flames straight away
iron	very slowly turns black

(i) Which is the **most** reactive metal in the table?

.....

1 mark

(ii) Which is the **least** reactive metal in the table?

.....

1 mark

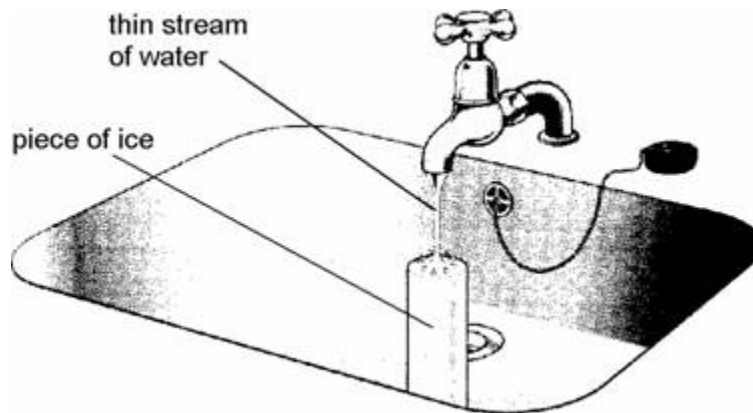
Maximum 6 marks

7.

Zoë wants to investigate the way rock is worn away by running water.

She uses a long piece of ice rather than a piece of rock.

She places the ice in a sink and lets a thin stream of cold water run slowly over it.



(a) The thin stream of water starts to change the shape of the piece of ice. What shape would form in the top of the piece of ice?

.....

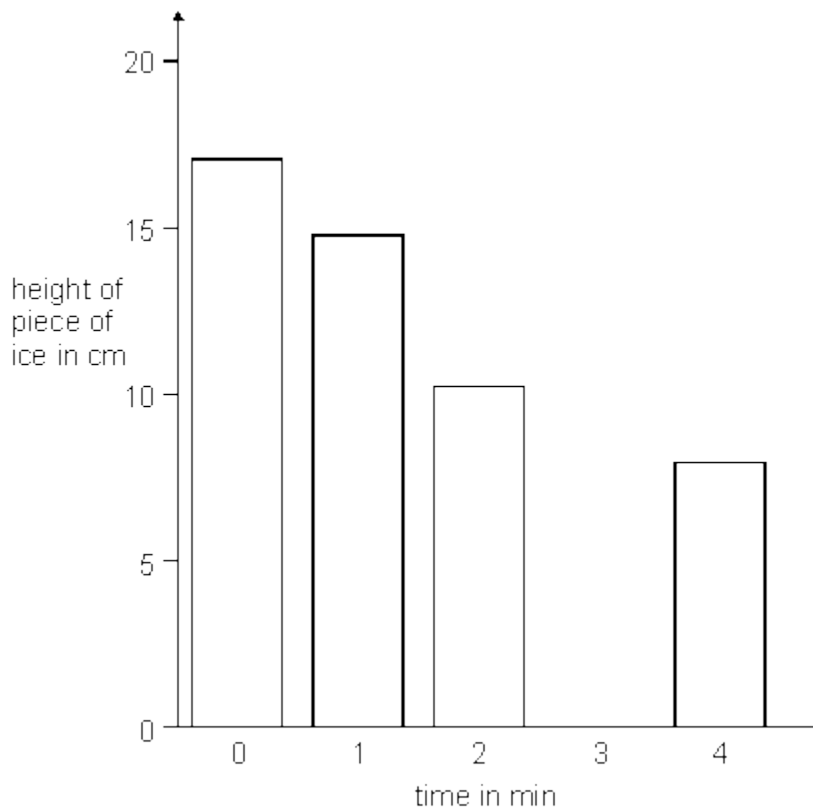
1 mark

(b) Zoë's experiment was **not** a good way of showing how rocks are worn away by water. The ice was worn down a little, but mostly it got smaller for a **different** reason. Why did the piece of ice get smaller?

.....

1 mark

Zoë measures the height of the piece of ice at different times. She plots a bar chart of her results.



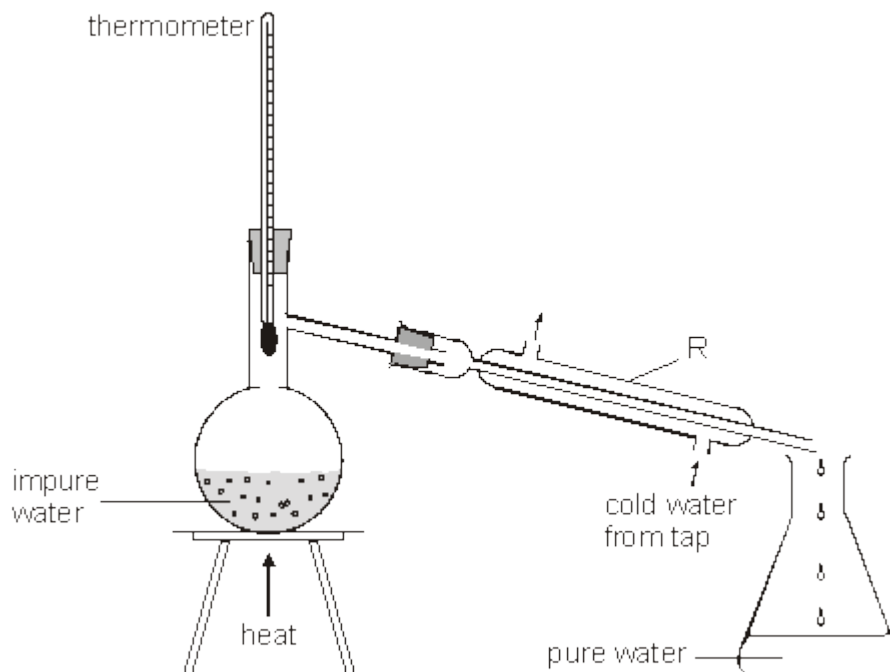
(c) Draw in the bar for the height of the ice after 3 minutes.

1 mark

Maximum 3 marks

8.

(a) The apparatus in the diagram below is used to obtain pure water from impure water.



(i) What temperature would the thermometer show?

.....°C

1 mark

(ii) What is the function of the piece of apparatus labelled R?

.....
.....

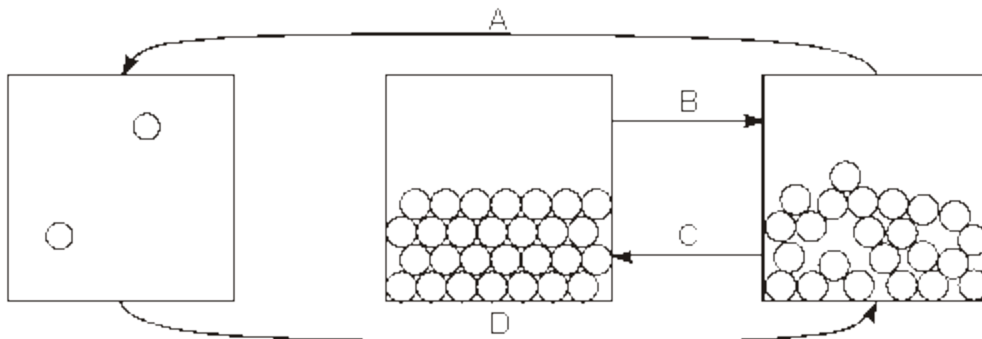
1 mark

(iii) Give the name of the process which purifies water in this way.

.....

1 mark

(b) The diagram below shows particles in a gas, a solid and a liquid. Each arrow, A, B, C and D, represents a change of state.



(i) Choose from the following words to complete the sentences below.

boiling **condensing** **distilling** **evaporating**
filtering **freezing** **melting**

Change of state A is called

Change of state B is called

Change of state C is called

Change of state D is called

4 marks

(ii) Look back to the apparatus in part (a).

Give the letter, A, B, C or D, from the diagram above, for the change of state which occurs:

in the round-bottomed flask

in the piece of apparatus labelled R.

2 marks

Maximum 9 marks