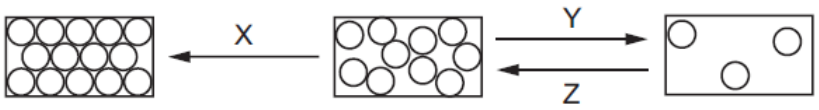
# The Particulate nature of matter – 2023 June IGCSE Chemistry 0620

**1.** Nov/2023/Paper_0620/11/No.1

The three rectangles show the arrangements of the particles in each of the three states of matter.

X, Y and Z represent the processes needed to change from one state to another.




What are the processes X, Y and Z?

| | X | Y | Z |
|---|---|---|---|
| **A** | melting | condensing | evaporating |
| **B** | evaporating | melting | freezing |
| **C** | melting | freezing | condensing |
| **D** | freezing | evaporating | condensing |

**2.** Nov/2023/Paper_0620/11/No.2

Which substance is a pure compound?

**A** air

**B** brass

**C** ethanol

**D** petroleum

**3.** Nov/2023/Paper_0620/12/No.1

The melting points and boiling points of four elements are shown.

| element | melting point / °C | boiling point / °C |
|---|---|---|
| W | –7 | 60 |
| X | –101 | –34 |
| Y | 114 | 184 |
| Z | 39 | 688 |

In which elements do the particles vibrate about fixed positions at 0 °C?

**A** W and X **B** W and Z **C** X and Y **D** Y and Z

**4.** Nov/2023/Paper_0620/12/No.2

Which statements about clean, dry air are correct?

1 It is a mixture of elements only.

2 It is a mixture of elements and compounds.

3 It contains only non-metals.

**A** 1 and 3 **B** 1 only **C** 2 and 3 **D** 2 only

**5.** Nov/2023/Paper_0620/13/No.1

Which statement about solids, liquids or gases is correct?

**A** Solids are easy to compress.

**B** Liquids are easy to compress.

**C** Liquids expand to fill their container.

**D** Gases expand to fill their container.

**6.** Nov/2023/Paper_0620/13/No.2

Which substance is a mixture?

**A** air

**B** graphite

**C** oxygen

**D** water

**7.** Nov/2023/Paper_0620/21/No.1

A gas is placed in a sealed container. The gas has a pressure of one atmosphere and a temperature of 50 °C.

It is heated to 100 °C.

Which row describes the cause of the pressure of the gas and the effect of increasing the temperature of the gas?

| | cause of gas pressure | the effect of increased temperature of the gas |
|---|---|---|
| **A** | collisions between gas particles | collisions become less frequent |
| **B** | collisions between gas particles | the average speed of the gas particles increases |
| **C** | collisions between gas particles and the container | collisions become less frequent |
| **D** | collisions between gas particles and the container | the average speed of the gas particles increases |

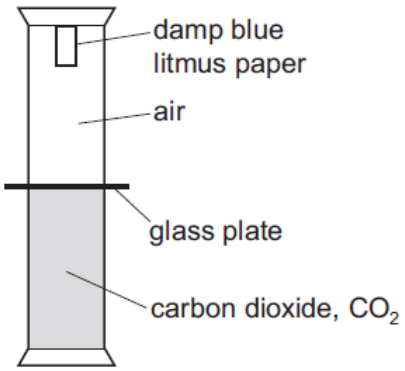
**8.** Nov/2023/Paper_0620/21/No.2

Four experiments, each containing a different acidic gas, are set up as shown.

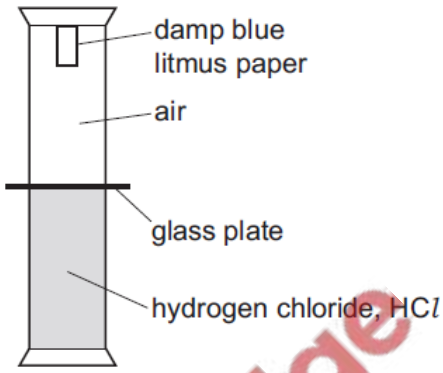
The dividing glass plates are removed at the same time.

In which set of apparatus does the litmus turn red first?

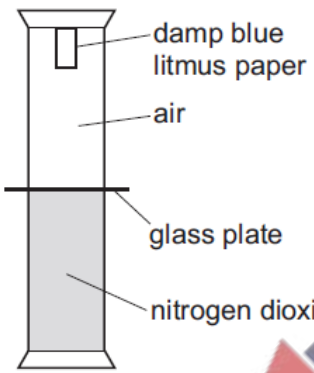
**A**



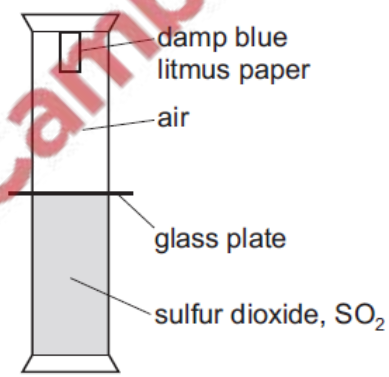

**B**




**C**

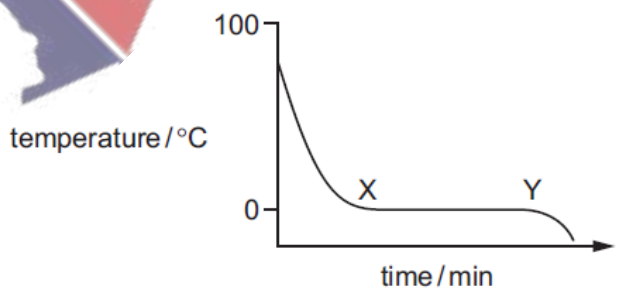



**D**




**9.** Nov/2023/Paper_0620/22/No.1

Part of a cooling curve for water is shown.




What is occurring between points X and Y?

**A** Steam is condensing into water.

**B** The temperature of the water is decreasing.

**C** Ice is melting.

**D** Particles are losing heat to the surroundings.

**10.** Nov/2023/Paper_0620/22/No.2

Which statements about clean, dry air are correct?

1 It is a mixture of elements only.

2 It is a mixture of elements and compounds.

3 It contains only non-metals.

**A** 1 and 3 **B** 1 only **C** 2 and 3 **D** 2 only

**11.** Nov/2023/Paper_0620/23/No.1

A sample of a gas occupies 340 $cm^3$ at room temperature and pressure.

The temperature and pressure are both increased, but the volume occupied by the gas remains 340 $cm^3$.

Which row describes what happens to the particle speed and the average distance between the particles in the gas when the temperature and pressure are both increased?

| | particle speed | average distance between particles |
|---|---|---|
| **A** | unchanged | unchanged |
| **B** | unchanged | increased |
| **C** | increased | unchanged |
| **D** | increased | increased |

**12.** Nov/2023/Paper_0620/23/No.2

Which statements about the rate of diffusion of the gases ammonia, carbon monoxide, nitrogen and oxygen are correct?

1 Nitrogen and carbon monoxide will diffuse at the same rate.

2 Oxygen will diffuse slowest because it is an element, whereas the others are compounds.

3 Ammonia will diffuse fastest.

**A** 1 and 2 **B** 1 and 3 **C** 1 only **D** 2 and 3

**13.** Nov/2023/Paper_0620/23/No.8

Which substance is a mixture?

**A** air

**B** graphite

**C** oxygen

**D** water

**14.** Nov/2023/Paper_0620/31/No.2(a)

**(a)** Fig. 2.1 shows the distillation apparatus that can be used to separate water from aqueous copper(II) sulfate.

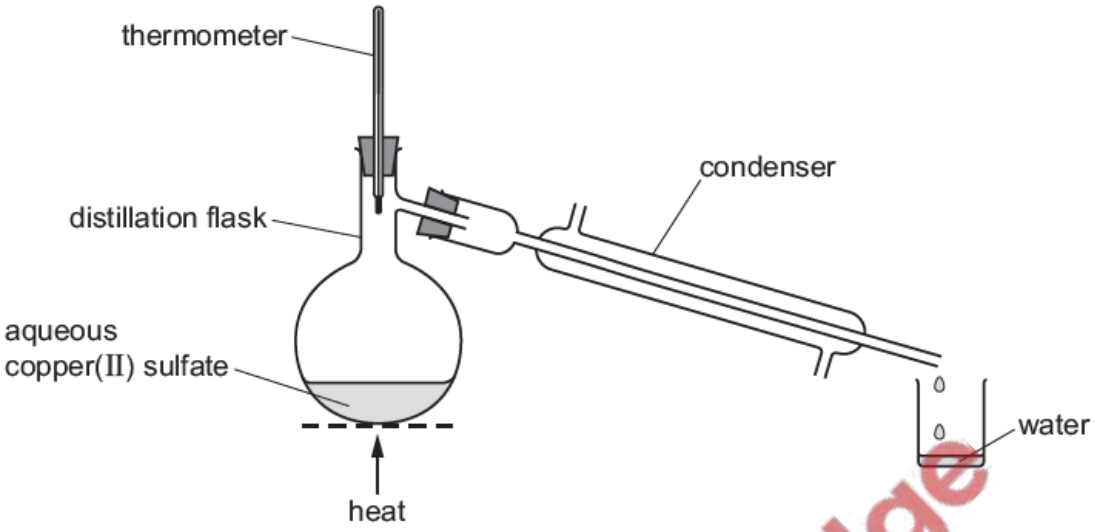



**Fig. 2.1**

Explain how distillation separates water from aqueous copper(II) sulfate.

.....

.....

..... [2]

**15.** Nov/2023/Paper_0620/31/No.4

Bromine is a liquid at room temperature.

**(a)** State **two** general properties of a liquid.

1 .....

.....

2 .....

.....

[2]

**(b)** Fig. 4.1 shows the physical states of bromine.

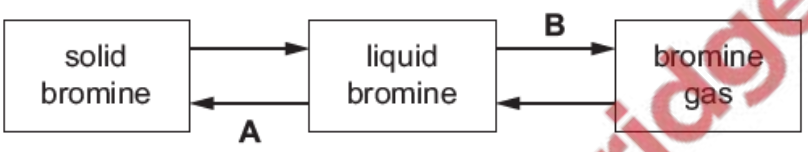



**Fig. 4.1**

Name the changes of physical states **A** and **B**.

**A** .....

**B** .....

[2]

**(c)** Describe liquid bromine and bromine gas in terms of the arrangement and motion of the particles.

liquid bromine

arrangement .....

.....

motion .....

.....

bromine gas

arrangement .....

.....

motion .....

.....

[4]

**(d)** A sealed gas syringe contains 80 $cm^3$ of bromine gas.

State how decreasing the pressure affects the volume of bromine gas in the gas syringe when the temperature remains constant.

..... [1]

[Total: 9]

**16.** Nov/2023/Paper_0620/32/No.2(a)

Petroleum is a mixture of hydrocarbons.

**(a)** Describe **two** characteristics of a mixture.

1 .....

.....

2 .....

.....

[2]

**17.** Nov/2023/Paper_0620/32/No.4

Tin is a solid at room temperature.

**(a)** State **two** general properties of a solid.

1 .....

.....

2 .....

.....

[2]

**(b)** Fig. 4.1 shows the physical states of tin.

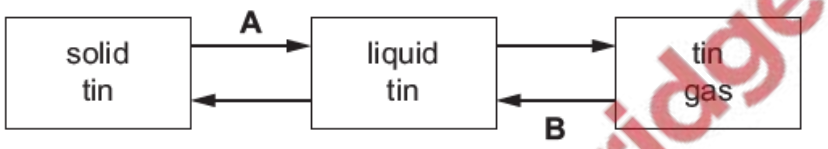



**Fig. 4.1**

Name the changes of physical states **A** and **B**.

**A** .....

**B** .....

[2]

**(c)** Describe solid and liquid tin in terms of the separation and motion of the particles.

solid tin

separation .....

.....

motion .....

.....

liquid tin

separation .....

.....

motion .....

.....

[4]

**(d)** A sealed gas syringe contains 80 $cm^3$ of carbon dioxide gas.

State how decreasing the temperature affects the volume of carbon dioxide gas in the gas syringe when the pressure remains constant.

..... [1]

[Total: 9]

**18.** Nov/2023/Paper_0620/33/No.4

Nitrogen is a gas at room temperature.

**(a)** State **two** general properties of a gas.

1 .....

.....

2 .....

.....

[2]

**(b)** Fig. 4.1 shows the physical states of nitrogen.

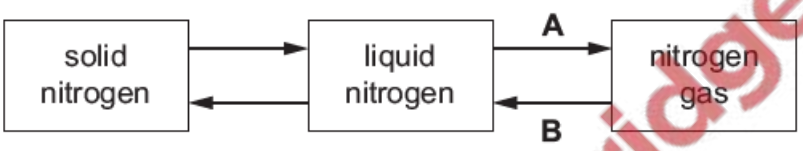



**Fig. 4.1**

Name the changes of physical states **A** and **B**.

**A** .....

**B** .....

[2]

**(c)** Describe solid nitrogen and nitrogen gas in terms of the arrangement and separation of the particles.

solid nitrogen

arrangement .....

.....

separation .....

.....

nitrogen gas

arrangement .....

.....

separation .....

.....

[4]