Cambridge IGCSE
Topical Past Papers

CHEMISTRY 9-1

0971 P2

2020 — 2025

1 - (0971/21_Summer_2020_Q1)

A mixture of ice and water is left to stand and the ice melts.

Which row describes what happens as the ice is melting?

	temperature of mixture	energy changes
A	increases	average kinetic energy of particles increases
B	increases	energy is used to overcome attractive forces
C	stays the same	average kinetic energy of particles increases
D	stays the same	energy is used to overcome attractive forces

2 - (0971/21_Summer_2020_Q7)

Which statement explains why methane has a lower boiling point than water?

A Methane has weaker covalent bonds than water.

B Methane has weaker attractive forces than water.

C Methane molecules are heavier than water molecules.

D Methane molecules have more bonds than water molecules.

3 - (0971/22_Summer_2020_Q1)

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D	stays the same	energy is used to overcome attractive forces

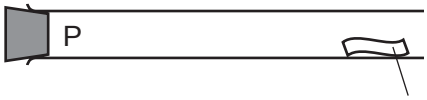
4 - (0971/22_Winter_2020_Q1)

Which gas has the slowest rate of diffusion?

A H_2 **B** NH_3 **C** CH_4 **D** CO_2

5 - (0971/21_Summer_2021_Q1)

A gas is released at point P in the apparatus shown.



damp universal indicator paper

Which gas turns the damp universal indicator paper red most quickly?

A ammonia, NH_3

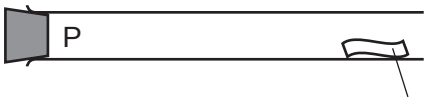
B chlorine, Cl_2

C hydrogen chloride, HCl

D sulfur dioxide, SO_2

6 - (0971/22_Summer_2021_Q1)

A gas is released at point P in the apparatus shown.



damp universal indicator paper

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A ammonia, NH_3

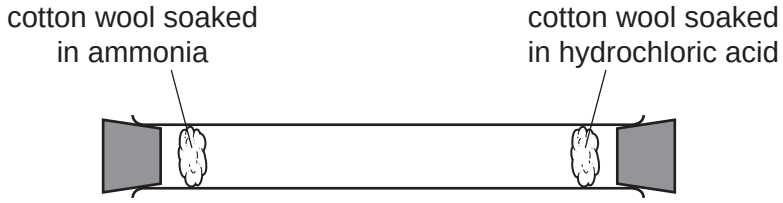
B chlorine, Cl_2

C hydrogen chloride, HCl

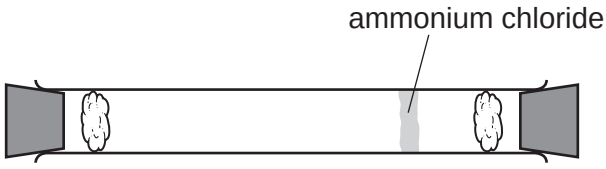
D sulfur dioxide, SO_2

7 - (0971/22_Winter_2021_Q1)

An experiment is set up as shown.



After several minutes, a white ring of ammonium chloride appears as shown.



Which statement explains the observation after several minutes?

A Ammonia gas diffuses faster than hydrogen chloride gas because its molecules have a lower molecular mass.

B Ammonia gas diffuses faster than hydrogen chloride gas because its molecules have a higher molecular mass.

C Ammonia gas diffuses slower than hydrogen chloride gas because its molecules have a lower molecular mass.

D Ammonia gas diffuses slower than hydrogen chloride gas because its molecules have a higher molecular mass.

8 - (0971/22_Winter_2021_Q7)

Which statement describes the attractive forces between molecules?

A They are strong covalent bonds which hold molecules together.

B They are strong ionic bonds which hold molecules together.

C They are weak forces formed between covalently-bonded molecules.

D They are weak forces which hold ions together in a lattice.

9 - (0971/21_Summer_2022_Q1)

Which two gases will diffuse at the same rate, at the same temperature?

A carbon monoxide and carbon dioxide

B carbon monoxide and nitrogen

C chlorine and fluorine

D nitrogen and oxygen

10 - (0971/22_Summer_2022_Q1)

Which two gases will diffuse at the same rate, at the same temperature?

A carbon monoxide and carbon dioxide

B carbon monoxide and nitrogen

C chlorine and fluorine

D nitrogen and oxygen

11 - (0971/22_Winter_2022_Q1)

The rate of diffusion of three gases, ammonia, carbon dioxide and methane, is measured.

What is the order of the rate of diffusion of the gases from slowest to fastest?

A $CO_2 \rightarrow NH_3 \rightarrow CH_4$

B $CO_2 \rightarrow CH_4 \rightarrow NH_3$

C $CH_4 \rightarrow NH_3 \rightarrow CO_2$

D $NH_3 \rightarrow CH_4 \rightarrow CO_2$

12 - (0971/22_Winter_2022_Q2)

Which description of Brownian motion is correct?

A random movement of particles due to bombardment by larger particles

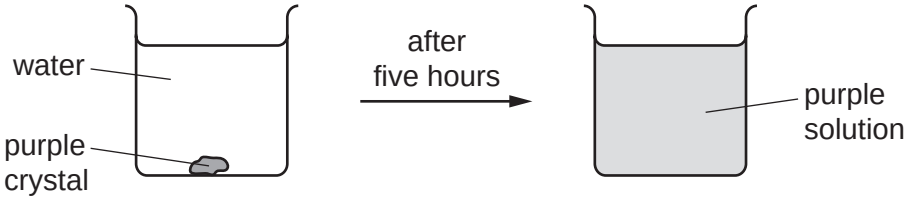
B random movement of particles due to bombardment by smaller particles

C random movement of particles from a high concentration to a low concentration

D random movement of particles from a low concentration to a high concentration

13 - (0971/21_Summer_2023_Q1)

The diagram shows the result of dropping a purple crystal into water.



Which processes take place in this experiment?

	chemical reaction	diffusing	dissolving
A	✓	✓	✗
B	✓	✗	✗
C	✗	✗	✓
D	✗	✓	✓

14 - (0971/22_Summer_2023_Q1)

Four physical changes of ethanol are listed.

1 condensation

2 evaporation

3 freezing

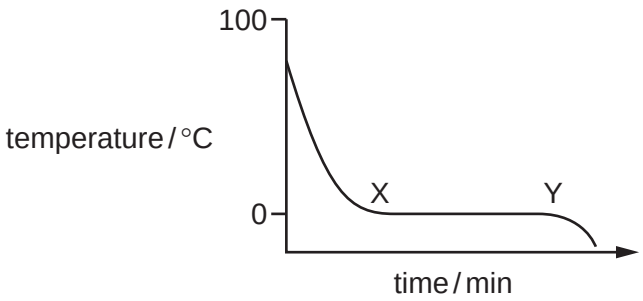
4 boiling

In which changes do the particles move further apart?

A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

15 - (0971/22_Winter_2023_Q1)

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.

16 - (0971/21_Summer_2024_Q1)

A gas is heated. The pressure is kept constant.

Which statement describes the behaviour of the particles in the gas?

A The particles move faster and become closer together.

B The particles move faster and become further apart.

C The particles move more slowly and become closer together.

D The particles move more slowly and become further apart.

17 - (0971/21_Summer_2024_Q2)

A mixture of ice and water is left to stand and the ice melts.

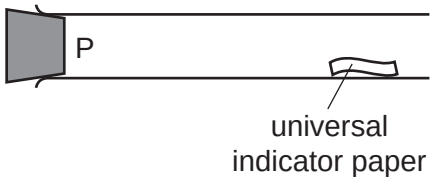
Which row describes what happens as the ice is melting?

	temperature of mixture	energy change
A	increases	average kinetic energy of particles decreases
B	increases	energy is used to overcome attractive forces
C	stays the same	average kinetic energy of particles decreases
D	stays the same	energy is used to overcome attractive forces

18 - (0971/21_Summer_2024_Q3)

Hydrogen chloride gas [M_r: HC*l*, 36.5] is released at P in the apparatus shown.

The universal indicator paper turns red after 38 s.



The experiment is repeated using sulfur dioxide gas [M_r: SO_2, 64].

What is the result for sulfur dioxide gas?

	universal indicator paper turns	time for universal indicator paper to change colour / s
A	blue	26
B	blue	51
C	red	26
D	red	51

19 - (0971/22_Summer_2024_Q1)

Which gas has the slowest rate of diffusion?

A H_2 **B** NH_3 **C** CH_4 **D** CO_2

20 - (0971/22_Winter_2024_Q1)

Oxygen melts at –219 °C and boils at –183 °C.

At which temperature is oxygen a liquid?

A –225 °C **B** –189 °C **C** –175 °C **D** 25 °C

21 - (0971/22_Winter_2024_Q2)

The pressure of a sample of gas is decreased. The temperature is kept constant.

Which row describes the effects on the particles?

	movement of particles	collisions between particles
A	slower	occur less often
B	slower	occur with more force
C	no change in speed	occur less often
D	no change in speed	occur with more force

22 - (0971/21_Summer_2025_Q1)

A gas is placed in a sealed container with a fixed volume.

The gas is heated.

Which statements are correct?

1 The gas molecules move around faster.

2 The gas particles collide with the walls of the container more frequently.

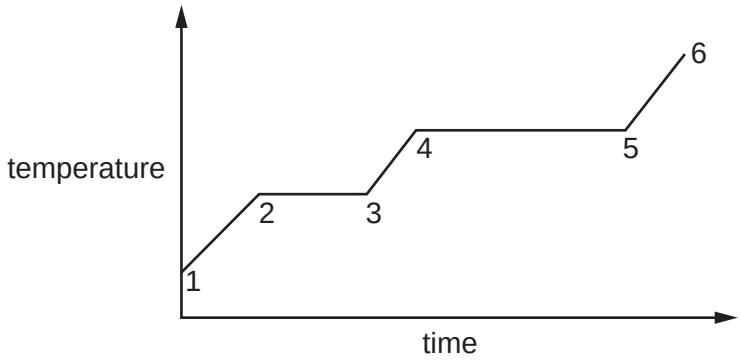
3 The pressure in the container decreases.

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

23 - (0971/21_Summer_2025_Q2)

A sample of ethanol is heated at a constant rate.

The heating curve for this sample is shown.



Which statement about the heating curve is correct?

A Ethanol changes its physical state between 3 and 4.

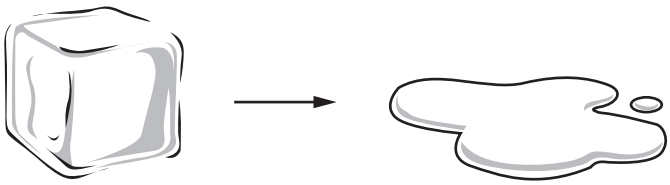
B Ethanol condenses between 2 and 3.

C Energy is absorbed between 3 and 4 but **not** absorbed between 4 and 5.

D More energy is absorbed between 4 and 5 than between 2 and 3.

24 - (0971/22_Summer_2025_Q1)

An ice cube melts.



What happens to the molecules of water in the ice cube?

A They evaporate.

B They dissolve.

C They gain energy.

D They lose energy.

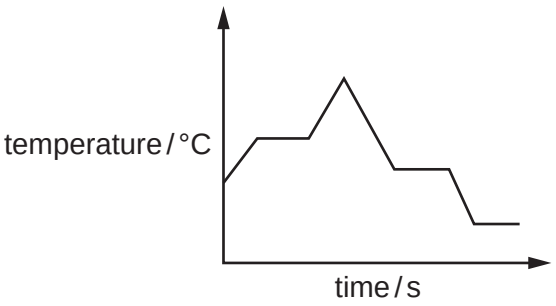
25 - (0971/22_Summer_2025_Q2)

A sample of a liquid, X, is heated to a temperature above its boiling point.

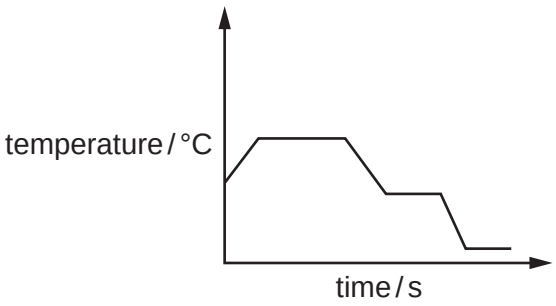
X is then cooled, so that it condenses and then freezes.

Which graph describes the change in temperature of X over time?

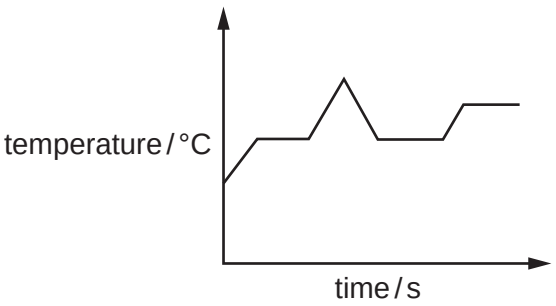
A



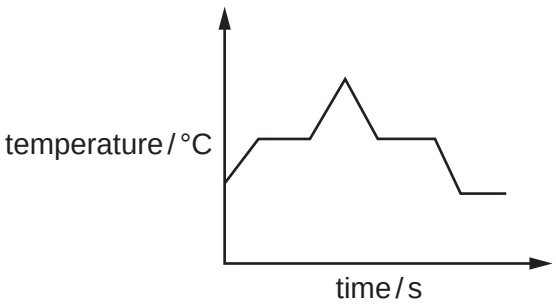
B



C



D



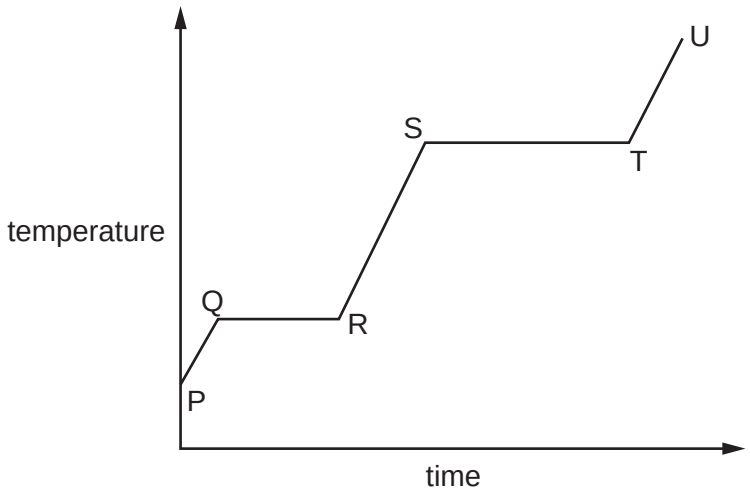
26 - (0971/22_Winter_2025_Q1)

What happens to the volume of a fixed mass of gas when the temperature is increased or the pressure is decreased?

	increased temperature	decreased pressure
A	volume decreased	volume decreased
B	volume decreased	volume increased
C	volume increased	volume decreased
D	volume increased	volume increased

27 - (0971/22_Winter_2025_Q2)

The diagram shows the heating curve for a substance.



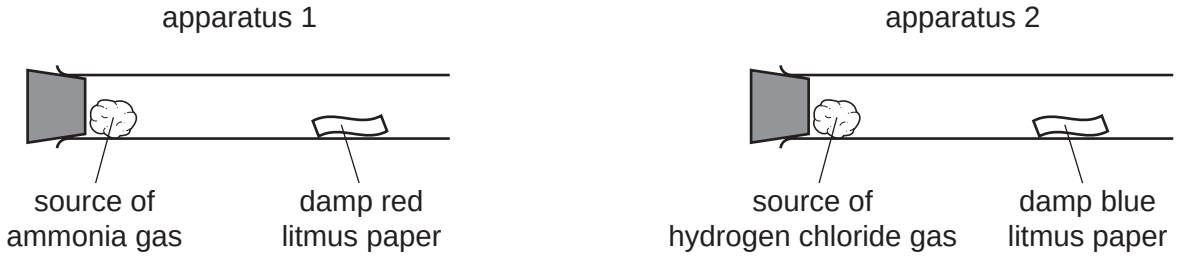
Between which two points do the particles of the substance change from being in fixed positions to being mobile?

A P and Q **B** Q and R **C** S and T **D** T and U

28 - (0971/22_Winter_2025_Q3)

A student investigates the diffusion of ammonia gas, NH_3, and hydrogen chloride gas, HCl.

Two sets of apparatus are set up as shown at room temperature and pressure.



The damp red litmus paper in apparatus 1 changes colour after 30 seconds.

How long does it take for the damp blue litmus paper in apparatus 2 to change colour?

A 21 seconds

B 30 seconds

C 64 seconds

D The damp blue litmus paper does **not** change colour.

1 – D	21 – C	41 –	61 –	81 –
2 – B	22 – A	42 –	62 –	82 –
3 – D	23 – D	43 –	63 –	83 –
4 – D	24 – C	44 –	64 –	84 –
5 – C	25 – D	45 –	65 –	85 –
6 – C	26 – D	46 –	66 –	86 –
7 – A	27 – B	47 –	67 –	87 –
8 – C	28 – C	48 –	68 –	88 –
9 – B	29 –	49 –	69 –	89 –
10 – B	30 –	50 –	70 –	90 –
11 – A	31 –	51 –	71 –	91 –
12 – B	32 –	52 –	72 –	92 –
13 – D	33 –	53 –	73 –	93 –
14 – C	34 –	54 –	74 –	94 –
15 – D	35 –	55 –	75 –	95 –
16 – B	36 –	56 –	76 –	96 –
17 – D	37 –	57 –	77 –	97 –
18 – D	38 –	58 –	78 –	98 –
19 – D	39 –	59 –	79 –	99 –
20 – B	40 –	60 –	80 –	100 –