

- 1 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

- 1 The three states of matter are solid, liquid and gas.

- (a) Complete Table 1.1 to describe the structures of solids, liquids and gases in terms of particle separation, particle arrangement and particle motion.

Table 1.1

state of matter	particle separation	particle arrangement	particle motion
solid	touching		
liquid			
gas		random	random

[3]

- (b) Substances can physically change.

Name each physical change:

- solid to liquid
- gas to liquid
- solid to aqueous.

[3]

- (c) Gases diffuse.

- (i) Describe, in terms of particles, why gases diffuse.

..... [1]

- (ii) State what determines the relative rate of diffusion of gases at constant temperature.

..... [1]

- (d) Gaseous oxides of nitrogen are atmospheric pollutants. One adverse effect of oxides of nitrogen is the formation of acid rain.

State **two other** adverse effects of oxides of nitrogen.

1.....

2.....

[2]

(e) In a catalytic converter, oxides of nitrogen are removed by reaction with the toxic gaseous product of the incomplete combustion of hydrocarbon fuels. Two non-toxic gases are formed in this reaction.

(i) Name the toxic gaseous product of the incomplete combustion of hydrocarbon fuels.

..... [1]

(ii) Name the **two** non-toxic gases formed in the catalytic converter.

1

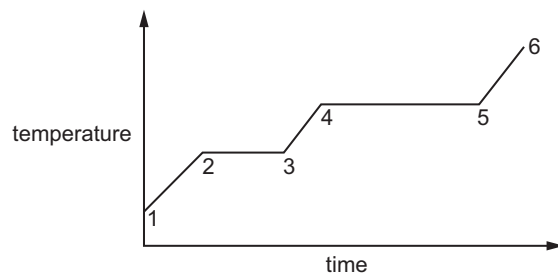
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[2]

[Total: 13]

2 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.

3 Which atom has an equal number of protons, neutrons and electrons?

- A ^{40}Ar B ^1H C ^{23}Na D ^{14}N

4 The only naturally occurring isotopes in a sample of europium are ^{151}Eu and ^{153}Eu . This sample of europium has a relative atomic mass, A_r , of 152.

What is the percentage of ^{151}Eu present in this sample to three significant figures?

- A 0.987% B 50.0% C 76.0% D 98.7%

5 Which statement about potassium chloride is correct?

- A It has a high melting point because it is a giant structure with strong covalent bonds.
- B It conducts electricity when solid because of its oppositely charged ions.
- C It conducts electricity when molten because its ions can move.
- D It is insoluble in water because of its strong bonding.