

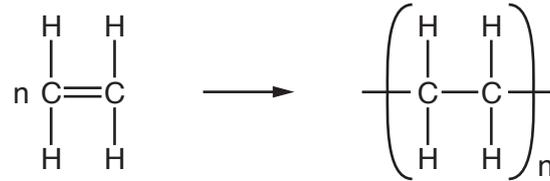


- 1 In liquids and gases, molecules are in constant motion.

Describe, in terms of the kinetic model, **two** differences between liquids and gases.

.....  
 .....[2]

- 2 Ethene can react as shown in the equation.



- (a) Give the name of this type of reaction.

.....[1]

- (b) State why the safe disposal of the type of product formed in this reaction is difficult.

.....  
 .....[1]

- 3 Fig. 3.1 shows an object that has only two forces acting on it. The forces have equal magnitudes  $F$  and act in opposite directions.

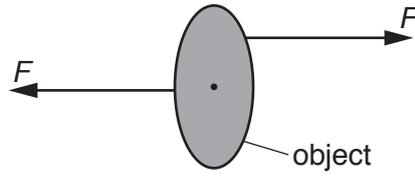


Fig. 3.1

State what is meant by *equilibrium* and explain why this object is **not** in equilibrium.

.....  
.....  
..... [2]

- 4 Radioactive decay is both random and spontaneous.

State what is meant by the decay being *random*,

.....  
.....

*spontaneous*.

.....  
.....

[2]

5 Nitrogen monoxide and carbon monoxide are both formed in internal combustion engines. These pollutants are removed from the exhaust gases using a catalyst.

(a) State what is meant by the term *catalyst*.

.....  
 .....[1]

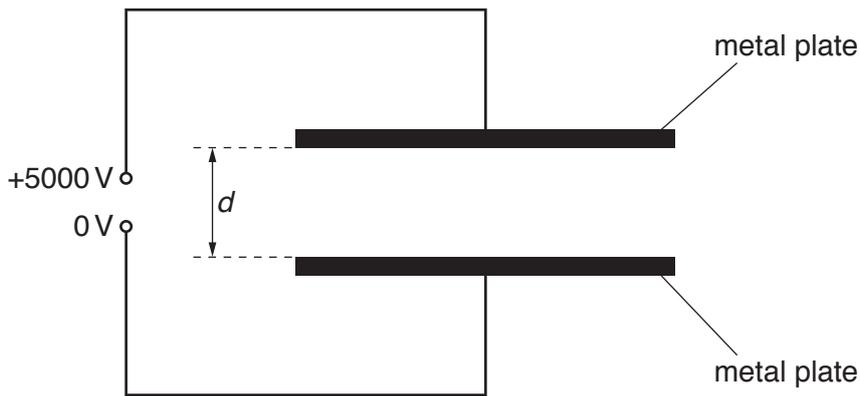
(b) Name a suitable catalyst for removing nitrogen monoxide and carbon monoxide from exhaust gases.

.....[1]

(c) Write an equation to show how nitrogen monoxide and carbon monoxide react together in the presence of a catalyst.

.....[1]

6 Fig. 6.1 shows two parallel metal plates with a potential difference (p.d.) of 5000 V across them.



**Fig. 6.1** (not to scale)

(a) On Fig. 6.1, draw at least five lines of force to show the electric field between the plates. [2]

(b) The distance *d* between the plates is 2.0 cm.

Calculate the electric field strength between the plates.

electric field strength = .....NC<sup>-1</sup> [2]

- 7 Mirabilite is a mineral. It is hydrated sodium sulfate,  $\text{Na}_2\text{SO}_4 \cdot x\text{H}_2\text{O}$ , where  $x$  is the number of molecules of water of crystallisation.

Mirabilite contains 55.9% by mass of water.

Calculate  $x$ .

$x = \dots\dots\dots$  [3]

- 8 Explain why the atomic radius decreases across Period 3 of the Periodic Table, from Na to Cl.

.....  
.....  
.....  
.....  
..... [3]

- 9 Diffraction of visible light occurs when the light passes through a gap.

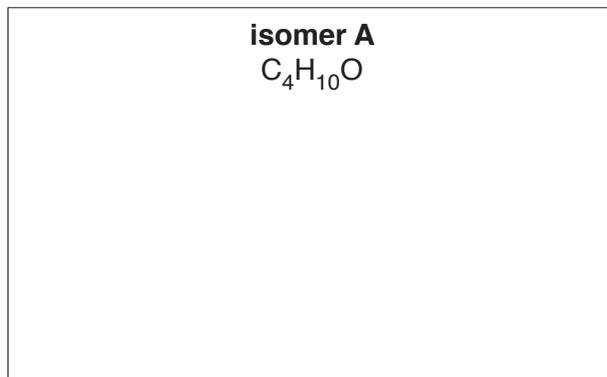
Suggest a suitable gap width to observe diffraction of visible light and give a reason for your answer.

gap width.....  
reason.....  
.....  
..... [2]

10 There are four isomeric alcohols with molecular formula  $C_4H_{10}O$ .

- (a) When heated under reflux conditions with acidified potassium dichromate(VI), isomer **A** did **not** react.

Draw the structural formula for isomer **A** in the box.

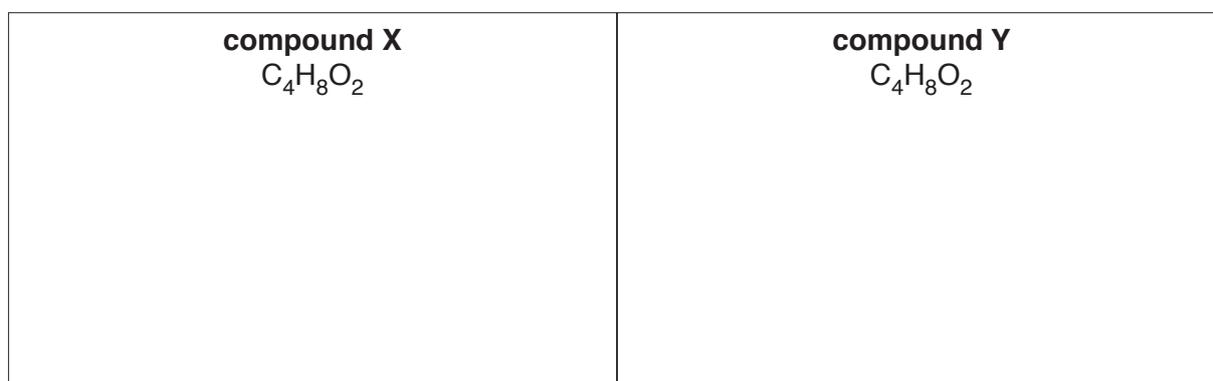


[1]

- (b) When heated separately under reflux conditions with acidified potassium dichromate(VI), two of the other isomers reacted to form compounds **X** and **Y**.

Compounds **X** and **Y** contain the same functional group and have the same molecular formula,  $C_4H_8O_2$ .

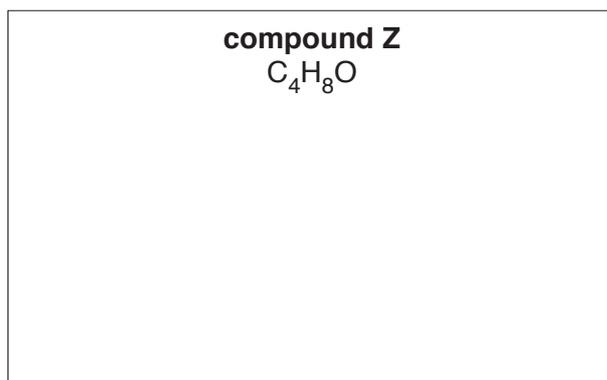
Draw the structural formulae for compound **X** and for compound **Y** in the boxes.



[2]

- (c) When heated under reflux conditions with acidified potassium dichromate(VI), the fourth isomer reacted to form compound **Z** with molecular formula  $C_4H_8O$ .

Draw the structural formula for compound **Z** in the box.



[1]

11 An electric heater is rated at 2.4 kW, 230 V.

The heater is connected to a 230 V mains supply.

(a) Calculate the resistance of the heater.

resistance = .....  $\Omega$  [1]

(b) The supply voltage drops to 210 V.

Calculate the drop in power output from the heater.

Assume that the resistance of the heater does not change.

drop in power = ..... W [2]

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