Multiple Choice Questions [40 marks]

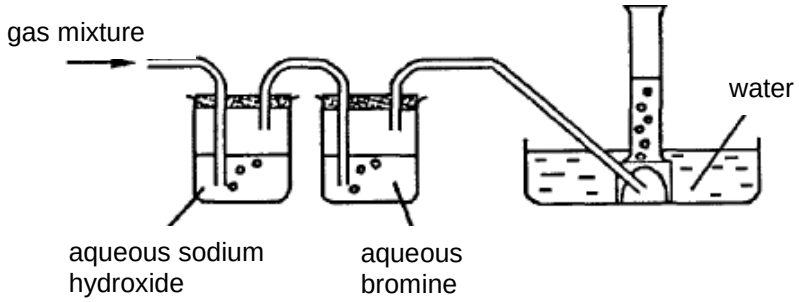
Answer **all** questions and shade your answers on the OMR sheet provided.

1 What physical processes could be used to separate ethanol and water?

1 distillation
2 filtration
3 sublimation
4 use of separating funnel

A 1 only
B 1 and 4 only
C 1, 2 and 3 only
D 1, 2, 3 and 4

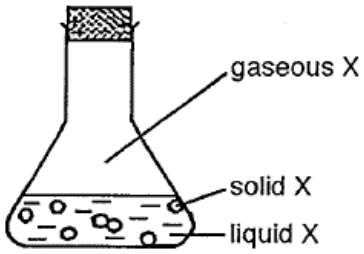
2 A mixture of gases is passed through the apparatus shown.
Only one of the gases is collected.



What is the property of this gas?

A The gas burns with a blue flame.
B The gas explodes in the presence of a lighted splint.
C The gas produces a white precipitate in limewater.
D The gas turns moist red litmus blue.

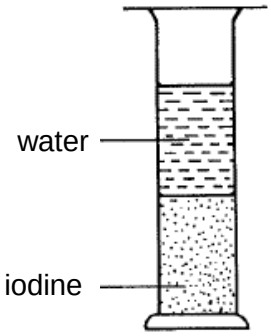
3 The conical flask contains compound X which is present in the solid, liquid and gaseous states.



Which statement is correct?

A A gaseous X molecule has a lower mass than a liquid X molecule.
B Energy is released when X changes from liquid to solid.
C Liquid X is at a higher temperature than solid X.
D Liquid X molecules vibrate about fixed positions.

4 An experiment was set up as shown below.



It was observed that after leaving it for several days, the liquid in the jar had the same colour throughout. This was the result of the movement of

A iodine and water molecules.
B iodine molecules.
C iodide ions and iodine atoms.
D iodide ions and water molecules.

5 Aqueous sodium hydroxide was added to a mixture of an aqueous solution of Z. On warming, ammonia gas evolved. When aluminium foil is added to the reaction mixture and warmed, more ammonia gas was given off.
What could be the identity of Z?

A aluminium nitrate
B aluminium sulfate
C ammonium nitrate
D ammonium sulfate

6 The table gives the electrical conductivity of four substances.

P	does not conduct under any condition
Q	conducts when dissolved in water
R	conducts when molten
S	conducts when solid and when molten

What could be the identity of P, Q, R and S?

	P	Q	R	S
A	ammonia	ethanol	magnesium oxide	zinc
B	ammonia	magnesium oxide	ethanol	zinc
C	ethanol	ammonia	magnesium oxide	zinc
D	magnesium oxide	ammonia	zinc	ethanol

7 Compound P contains two elements, metal Q and non-metal, R.

P consist of a lattice of positive and negative ions. Each positive ion is surrounded by four anions and each negative ion is surrounded by two cations.

What ions are present in, and what is the formula of, compound P?

	ions present	formula
A	$Q^{+}\ R^{2-}$	Q_2R
B	$Q^{2+}\ R^{-}$	QR_2
C	$R^{+}\ Q^{2-}$	R_2Q
D	$R^{2+}\ Q^{-}$	RQ_2

8 When excess aqueous ammonia is added to an aqueous solution of a salt X, a white precipitate forms. X also produces a white precipitate when added to aqueous lead(II) nitrate.

X could be

A aluminium sulfate
B calcium chloride
C zinc chloride
D zinc sulfate

9 Which of the following descriptions best distinguishes a weak acid from a strong acid?

A A weak acid is obtained by diluting a strong acid.
B A solution of a weak acid contains its own molecules.
C A solution of a weak acid has more hydrogen ions than hydroxide ions.
D All organic acids are weak acids and all inorganic acids are strong acids.

10 The formula of an oxide of element Y is Y_2O.
8.7g of Y_2O contains 7.1g of Y.

How many moles of Y does 7.1g of the element contain?

A $\frac{1.6}{16} \times 2$

B $\frac{1.6}{16} \times \frac{1}{2}$

C $\frac{8.7}{16} \times 2$

D $\frac{8.7}{16} \times \frac{1}{2}$

11 In an electrolysis experiment, the same amount of charge deposited 16.25g of zinc and 5.1g of vanadium.

What was the charge on the vanadium ion?

A 2+
B 3+
C 4+
D 5+

12 A small piece of sodium is added to aqueous iron(II) sulfate. Which of the following is **not** observed during this reaction?

A A grey solid is formed.
B A white precipitate is formed.
C Bubbles of gas are formed.
D The pale green solution turns colourless.

13 In which process is energy released?

A cracking of hydrocarbons
B electrolysis of molten lead(II) bromide
C freezing of water
D photosynthesis

14 Which structure does **not** contain atoms bonded to other atoms by four covalent bonds?

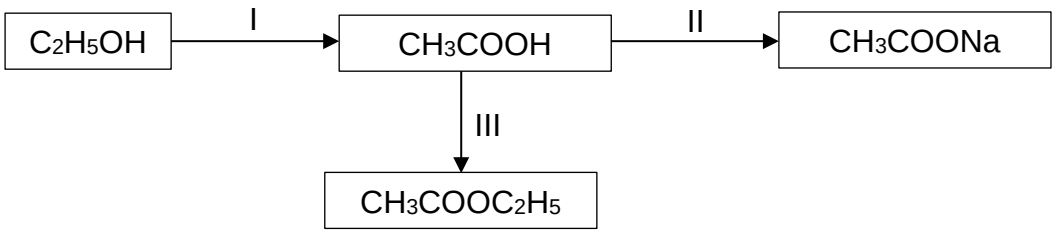
A ethene
B diamond
C graphite
D polyethene

15 The formation of metallic oxides involves the transfer of electrons from the metal atoms to oxygen atoms.

In the formation of one mole of which metallic oxide do the metal atoms **not** transfer exactly two mole of electrons?

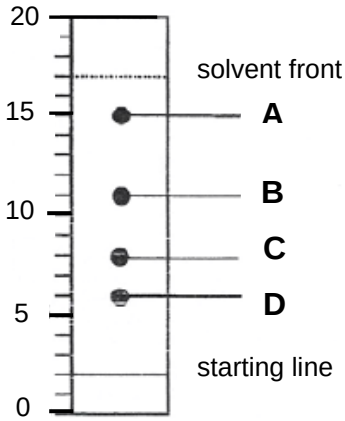
A calcium oxide
B iron(III) oxide
C zinc oxide
D sodium oxide

16 Which of the following reactions involve oxidation?



A I only
B II only
C I and II
D II and III

17 A drug was tested for purity through chromatography using propanol as the solvent. If the drug has an R_f value of 0.60, at which point should the spot be found?



18 Which of the following reactions is **not** a reduction reaction?

A Chorine displaces aqueous iodide to form chloride ions.
B Conversion of nitrogen dioxide in the catalytic converter.
C Discharge of aluminium ions at the cathode.
D Wine turns sour.

19 The dissociation constant (K_b) for a base indicates the extent to which it dissociates into ions in water. The higher the dissociation constant (K_b), the greater the extent of dissociation of the base. Hence, a stronger base will have a higher K_b value.

Generally, compounds from the amine homologous series form weak bases when dissolved in water.

The K_b values and structural formulae of some amine compounds are given in the following table.

amine	structural formulae	dissociation constant (K_b)
methylamine	CH_3NH_2	3.55×10^{-3}
ethylamine	$CH_3CH_2NH_2$	4.53×10^{-5}
propylamine	$CH_3CH_2CH_2NH_2$	4.61×10^{-5}
2-chloroethylamine	$ClCH_2CH_2NH_2$	4.28×10^{-2}

Based on the data above, which statement is correct?

A Aqueous methylamine turns universal indicator from green to violet.
B Increasing the length of the carbon chain makes the base stronger.
C Replacing a hydrogen atom by a chlorine atom in ethylamine makes the base weaker.
D There are less OH^- ions in a solution of ethylamine than that in a solution of propylamine of the same concentration.

20 Which metal will displace hydrogen from steam but **not** from cold water?

A calcium
B copper
C magnesium
D zinc

21 The thermal stability of metal nitrates is related to the position of the metal in the reactivity series in the same way as carbonates.

Which metal nitrate, on heating, will decompose to form the metal oxide?

A calcium nitrate
B potassium nitrate
C silver nitrate
D sodium nitrate

22 Metal M can be obtained from its oxide by heating with carbon and from its aqueous chloride by electrolysis.

Which is metal M?

A aluminium
B copper
C iron
D silver

23 Which of the following substances is classified correctly?

	substance added to blast furnace	main impurity in the iron formed
A	calcium oxide	iron(III) oxide
B	coke	silicon dioxide
C	limestone	carbon
D	iron(III) oxide	silica

24 Elements X, Y and Z are in the same period of the Periodic Table.

Oxide of X reacts with both alkali and acid.
Oxide of Y dissolves in water to form solution with pH < 7.
Solid Z conducts electricity.

In which order do the elements appear in the Periodic Table?

A $X \rightarrow Y \rightarrow Z$
B $Y \rightarrow X \rightarrow Z$
C $Z \rightarrow X \rightarrow Y$
D $Z \rightarrow Y \rightarrow X$

25 Which of the following properties or reactions shows that substance, X, is an alkali?

A On adding dilute hydrochloric acid to X solution, no precipitate is formed.
B Solution X dissolves zinc oxide.
C Solution X forms brown precipitate when reacted with iron(III) chloride solution.
D Solid X gives off ammonia gas when warmed with ammonium chloride.

26 In an experiment, 10.0 cm^3 of 0.5 mol/dm^3 aqueous copper(II) sulfate was mixed with 20.0 cm^3 of 1.0 mol/dm^3 of aqueous sodium hydroxide.

$$FeSO_4 + 2NaOH \rightarrow Fe(OH)_2 + Na_2SO_4$$

What will the reaction vessel contain when the reaction is complete?

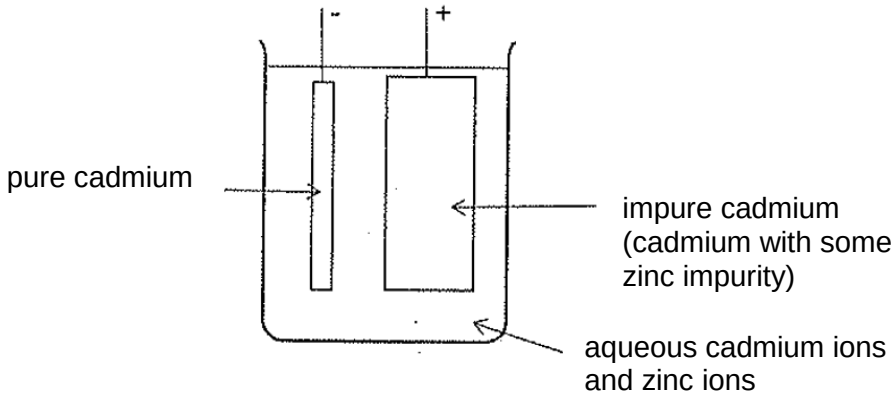
A a colourless solution
B a green precipitate and a green solution
C a green precipitate and a colourless solution
D a white precipitate and a green solution

27 The same quantity of electricity is passed through two solutions, one containing dilute sulfuric acid and the other an aqueous solution of a salt M_2SO_4.

If the volume of gas liberated at the cathode using sulfuric acid is 2.4 dm^3, what is the number of moles of M deposited?

A 0.050
B 0.100
C 0.200
D 0.250

28 Cadmium is a metal used to make rechargeable batteries. The purification of cadmium by electrolysis is shown below.
Cadmium and zinc form ions with the same electric charge.



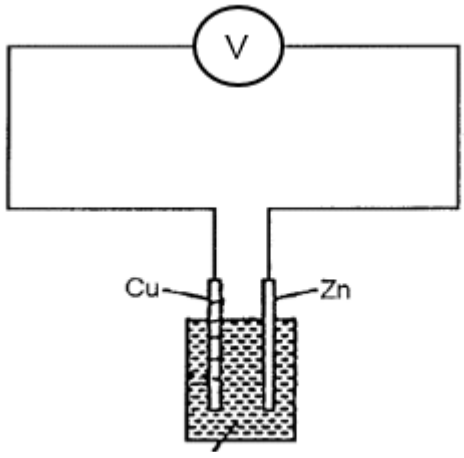
The following results were obtained from an investigation of this process:

	mass of impure cadmium electrode / g	mass of pure cadmium electrode / g
at the start of electrolysis	860	140
at the end of electrolysis	260	700

What is the percentage purity of cadmium in impure cadmium?

A 6.7% **B** 16.3% **C** 23.3% **D** 93.3%

29 Study the diagram of the simple cell below.



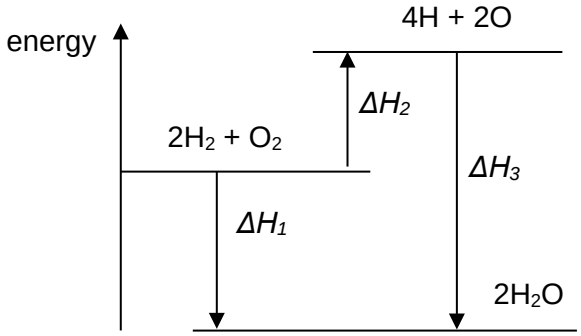
aqueous copper(II) sulfate

What could be observed after a few minutes?

1 Oxygen gas produced at the zinc electrode.
2 The zinc electrode was coated with a layer of pink solid.
3 Hydrogen gas produced at copper electrode.
4 The colour of copper(II) sulfate faded gradually.

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

30 The following energy level diagram represents the reaction between hydrogen and oxygen to form steam.



Which of the following shows the correct energy change?

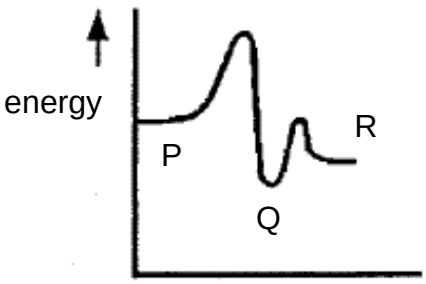
	energy absorbed for bond breaking	energy released for bond forming
A	ΔH_2	ΔH_3
B	ΔH_2	ΔH_1
C	ΔH_1	$\Delta H_3 - \Delta H_1$
D	ΔH_1	ΔH_3

31 In the conversion of compound P into compound R, it was found that the reaction proceeded by way of compound Q, which could be isolated. The steps involved were:

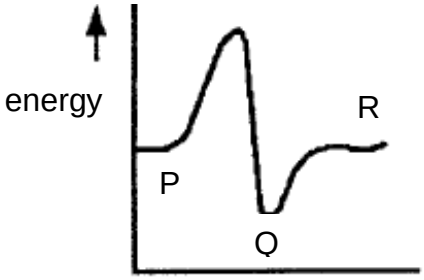
$$P \rightarrow Q \quad \Delta H > 0$$
$$Q \rightarrow R \quad \Delta H < 0$$

Which one of the following reaction profiles agrees with this data ?

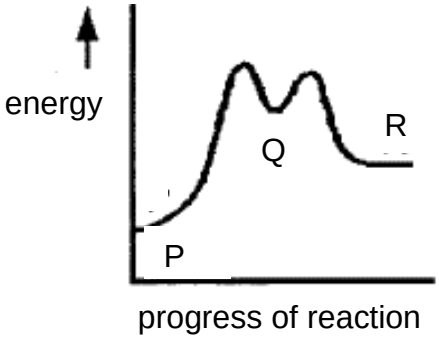
A



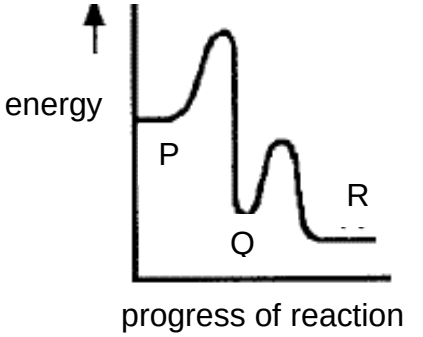
B



C



D



32 In the Haber process, nitrogen and hydrogen react to form ammonia.

Which statements are true about the process?

1 Ammonia is liquefied after being formed.
2 Hydrogen is obtained from fractional distillation of liquid air.
3 Some of ammonia formed decomposes to form nitrogen and hydrogen.
4 The reaction involves the use of a compound of transition metal.

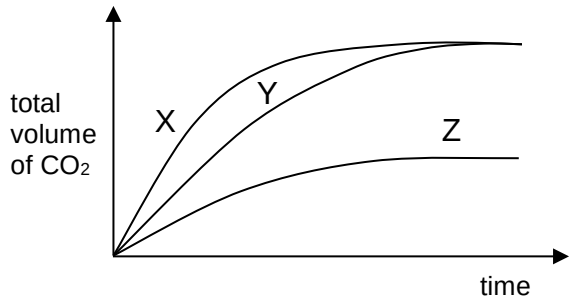
A 1 and 3
B 2 and 3
C 3 and 4
D 1, 2 and 4

33 Two experiments were carried out under the same conditions of temperature and pressure.

In experiment 1, an excess of powdered marble was added to 20 cm^3 of 0.100 mol/dm^3 hydrochloric acid.
In experiment 2, an excess of powdered marble was added to 20 cm^3 of 0.100 mol/dm^3 ethanoic acid.

The total volumes of carbon dioxide given off were measured at intervals and plotted against time.

Which of the following curves would be obtained in the two experiments?

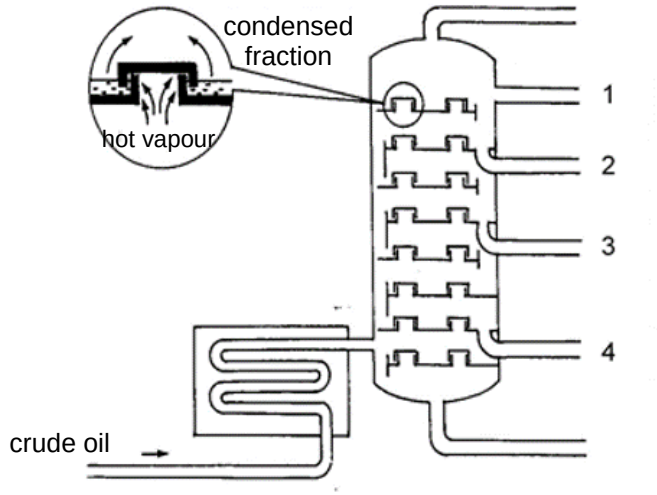


	experiment 1	experiment 2
A	X	Y
B	X	Z
C	Y	X
D	Y	Z

34 Two compounds are thought to be isomers. Possible similarities and differences are listed below. Which combination would suggest isomerism?

	similar	different
A	chemical properties	physical properties
B	molecular mass	molecular structure
C	molecular structure	molecular mass
D	physical properties	chemical properties

35 A schematic diagram of the fractionating tower for petroleum refinery is shown below.



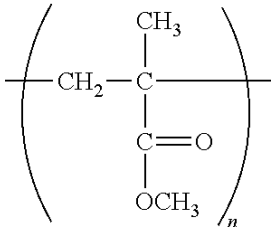
Which of the following statements is correct?

A Fraction 1 is in less demand than fraction 4.
B Fraction 2 is more flammable than fraction 3.
C Fraction 3 has higher boiling points than fraction 4.
D Fraction 2 contains molecules of larger molecular masses than fraction 3.

36 A pure fat has molecular mass of 500. Each fat molecule has two carbon-carbon double bonds.
What is the mass of iodine required to react with 125g of the fat?

A 31.8g
B 63.5g
C 127g
D 254g

37 Poly(methyl methacrylate) is used to make exterior lights of automobile.
Its structure is



Which of the following statements correctly describe poly(methyl methacrylate)?

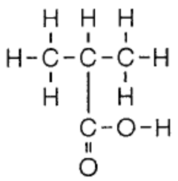
1 Its monomer is $CH_2 = C(CH_3)COOCH_3$.
2 It is unsaturated.
3 It is an ester.

A 1 and 2
B 2 and 3
C 1 and 3
D 1,2 and 3

38 An ester with molecular formula $C_6H_{12}O_2$ undergoes hydrolysis to form an alcohol G and an acid H. Alcohol G can be oxidised to acid H by warming with acidified potassium manganate(VII) The formula of the ester is

A $HCOOC_5H_{11}$
B $CH_3COOC_4H_9$
C $C_2H_5COOC_3H_7$
D $C_3H_7COOC_2H_5$

39 Which of the following are isomers in the same homologous series?

1


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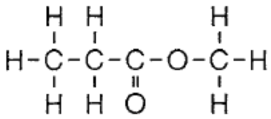

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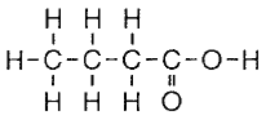
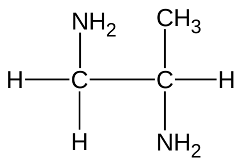
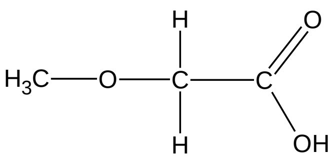
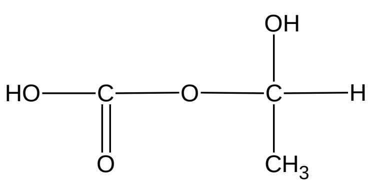


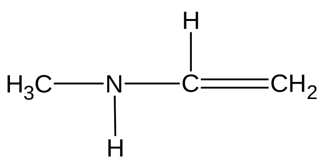
A 1 and 2
B 2 and 3
C 1 and 3
D 1, 2 and 3

40 Which of the following molecules cannot be used to carry out polymerization?

A


B


C


D


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