For Performance Measurement

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Advanced Level

CHEMISTRY 6031/1

PAPER 1 Multiple Choice

SPECIMEN PAPER 1 hour

Additional materials:
Data Booklet
Mathematical tables and/or Electronic calculator
Multiple Choice answer sheet
Soft pencil (type B or HB is recommended)

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has already been done for you.

There are **forty** questions in this paper. Answer **all** questions. For each question, there are four possible answers, **A**, **B**, **C** and **D**. Choose the one you consider correct and record your choice in soft pencil on the separate answer sheet.

Read very carefully the instructions on the answer sheet.

INFORMATION FOR CANDIDATES

Each correct answer will score one mark. A mark will not be deducted for a wrong answer. Any rough working should be done in this booklet.

This question paper consists of 16 printed pages.

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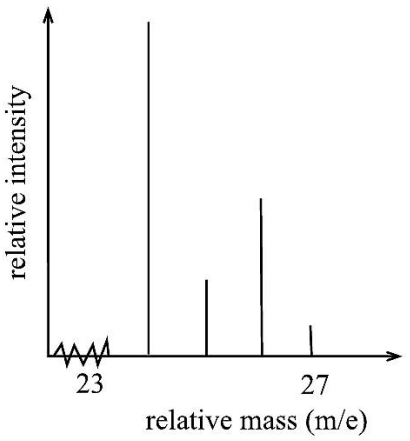
Section A

For each question there are four possible answers, **A, B, C** and **D**. Choose the one you consider to be correct.

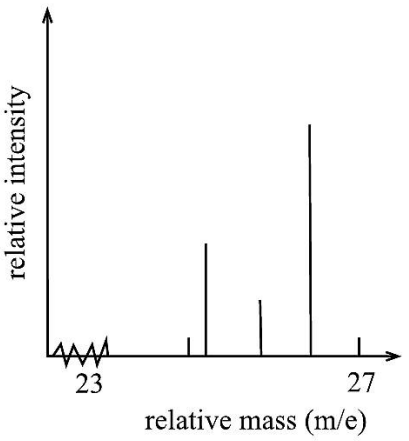
1 The average mass ratio of the isotopes of the element $^{24.3}\mathbf{X}$ in increasing order is 7 :1 : 2.

What is the mass spectrum of **X**?

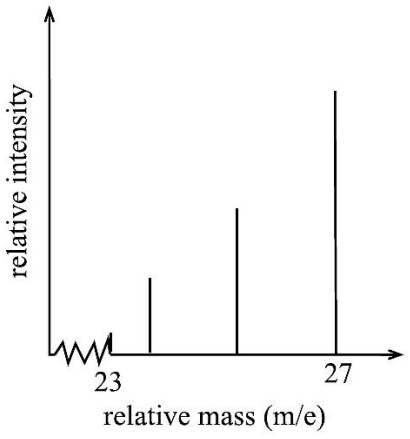
A



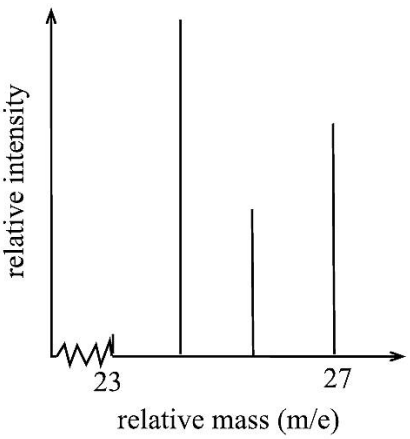
B



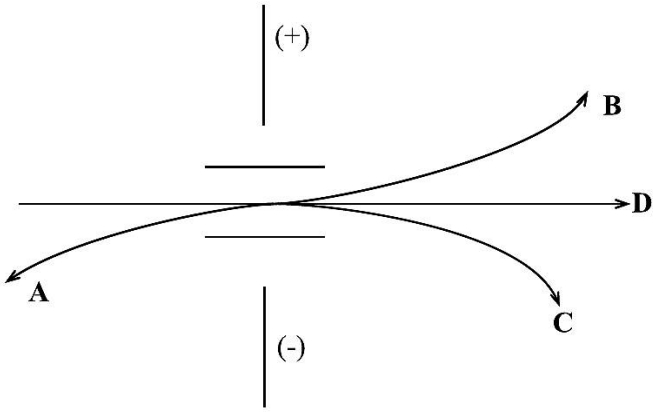
C



D



2 Which letter,**A**, **B**,**C** or **D** shows the correct behaviour of proton beams in an electric field?



3 Which molecule is pyramidal?

A SO_3
B PCl_3
C BF_3
D $AlCl_3$

4 What is the number of moles of a gas occupying a volume of 0.25 m^3 at1.01 x 10^3 Pa and 565 °C?

A $\frac{1.01 \times 10^3 \times 0.25}{8.31 \times 838}$

B $\frac{1.01 \times 10^3 \times 0.25}{8.31 \times 565}$

C $\frac{8.31 \times 838}{1.01 \times 10^3 \times 0.25}$

D $\frac{8.31 \times 565}{1.01 \times 10^3 \times 0.25}$

5 Which property of Group 7 hydrides increases down the group?

A acidity
B boiling point
C bond energy
D thermal stability

6 Which cation **A**, **B**,**C** or **D**is most oxidising?

A Pb^{2+}
B Cr^{3+}
C Fe^{3+}
D Sn^{2+}

7 Which acid **A**, **B**,**C** or **D**is the strongest?

	acid	$K_a$value
A	HF	3.5×10^{-4}
B	HClO	29×10^{-8}
C	$HClO_2$	1.1×10^{-2}
D	HCN	49×10^{-10}

8 The measured initial rates for the reaction, $X_{(g)} + Y_{(g)} \rightarrow Z_{(g)} + W_{(g)}$, for different concentrations of the reactants are shown.

$[X]$ / **moldm^{-3}**	$[Y]$ / **moldm^{-3}**	**initial rate / moldm^{-3}s^{-1}**
0.10	0.10	0.002
0.20	0.10	0.008
0.20	0.20	0.008

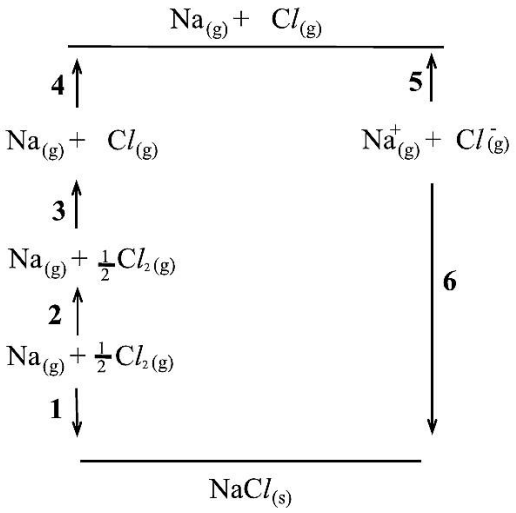
What is the rate expression for this reaction?

A $k[Y]^2$
B $k[X][Y]$
C $k[X]^2[Y]^2$
D $k[X]^2$

9 Which of the elements **A**, **B**, **C** or **D** is most reactive with water?

A Mg
B Be
C Sr
D Ca

10 The diagram shows a Born-Haber cycle for the formation of $NaCl_{(s)}$.



Which set correctly describes the enthalpy changes **1** and **3**?

	1	**3**
A	lattice	atomisation
B	formation	atomisation
C	formation	ionisation
D	lattice	ionisation

11 How many σ and π bonds are in a benzene molecule

	σ	π
A	6	3
B	12	3
C	6	6
D	12	12

12 Which reaction is feasible under standard conditions?

A $Al_{(s)} + 3Ag^{+}_{(aq)} \rightarrow Al^{3+}_{(aq)} + 3Ag_{(s)}$

B $Ni^{2+}_{(aq)} + Pb_{(s)} \rightarrow Ni_{(s)} + Pb^{2+}_{(aq)}$

C $Fe_{(s)} + Mg^{2+}_{(aq)} \rightarrow Fe^{2+} + Mg_{(s)}$

D $Zn_{(s)} + Ca^{2+}_{(aq)} \rightarrow Zn^{2+}_{(aq)} + Ca_{(s)}$

13 Which molecule or ion, **A**, **B**,**C** or **D** can act as a ligand?

A H_2O

B NO_2^+

C NH_4^+

D HCN

14 Ethanoic acid dissociates according to the equation:

$$CH_3COOH_{(aq)} + H_2O \rightleftharpoons H_3O^+_{(aq)} + CH_3COO^-_{(aq)}$$

What is the effect of adding sodium ethanoate to the equilibrium mixture?

A equilibrium shifts to the right

B more CH_3COO^- ions are produced

C H_3O^+ ion concentration increases

D H_3O^+ ion concentration decreases

15 Which atomic size relationship **A**, **B**, **C** or **D** is correct?

A P < S

B P > Se

C S < Cl

D S < Se

16 Which statement explains why the first ionisation energy of sulphur is less than that of phosphorus?

A The electron removed occupies a subshell at a higher energy level.

B The electron is at a greater distance from the nucleus.

C The electron experiences smaller effective nucleus charge.

D The electron experiences greater electron repulsion.

17 Which combination would result in a displacement reaction?

A $I_{2(s)} + NaBr_{(aq)}$

B $Cl_{2(g)} + NaI_{(aq)}$

C $Br_{2(l)} + NaCl_{(aq)}$

D $I_{2(s)} + NaCl_{(aq)}$

18 Nitrogen gas is used to manufacture ammonia by the Haber process as shown:

$$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_3 \quad \Delta H^{\theta} = -184 kJmol^{-1}$$

Which statement about the reaction is correct?

A 28g of N_2 produces 1 mole of NH_3

B low pressure favours the production of NH_3

C low temperature favours the production of NH_3

D high temperature favours the production of NH_3

19 Which electrochemical cell notation is correct for the reaction

$$5Fe_{(s)} + 2MnO_4^-{}_{(aq)} + 6H^+_{(aq)} \rightarrow 5Fe^{2+} + 2Mn^{2+}{}_{(aq)} + 8H_2O_{(aq)}?$$

A $MnO_4^-{}_{(aq)} / Mn^{2+}{}_{(aq)} \,//\, Fe_{(s)} / Fe^{2+}_{(aq)}$

B $Fe_{(s)} / Fe^{2+}_{(aq)} \,//\, MnO_4^-{}_{(aq)} / Mn^{2+}{}_{(aq)}$

C $Mn^{2+}{}_{(aq)}, H^+_{(aq)}, / MnO_4^-{}_{(aq)} \,//\, Fe^{2+}_{(aq)} / Fe_{(s)}$

D $Fe_{(s)} / Fe^{2+}_{(aq)} \,//\, MnO^-_{4(aq)}, H^+_{(aq)}, Mn^{2+} / Pt$

20 Which pair **A**, **B**,**C** or **D** are isomers?

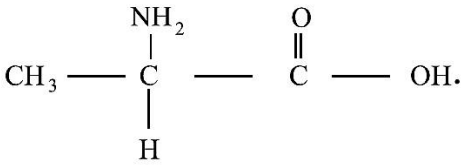
A propene, methylpropane

B propanone, ethanol

C propanal, propanone

D propanal, diethylether

21 The structure of alanine is shown



Which is a property of alanine?

A undergoes acid base reaction
B dissolves in non polar solvents
C has a low melting point
D the molecule is achiral

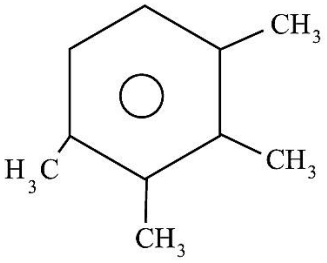
22 Which molecule exhibits geometrical isomerism?

A 2,4 – dichloro – 2 – but – 2 – ene
B 1,4 – dichlorobenzene.
C 4-methylhex – 2 – ene
D 1,1–dichloro – but – 1 – ene

23 An organic compound of the molecular formula $C_{10}H_{14}$ gives two products on aromatic substitution by chlorine.

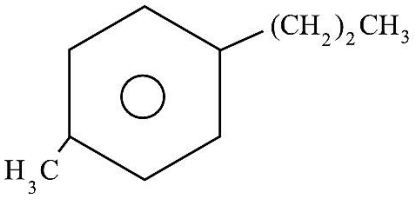
The organic compound could be

A



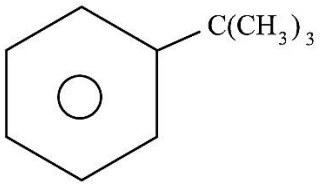
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B



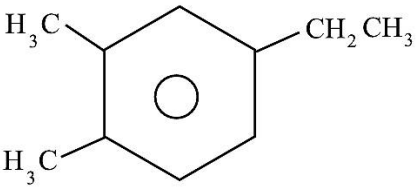
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C



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D

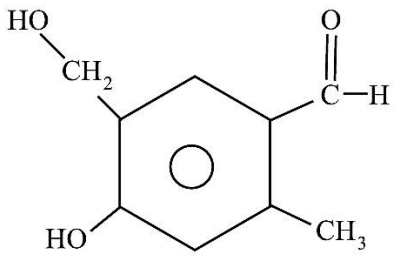


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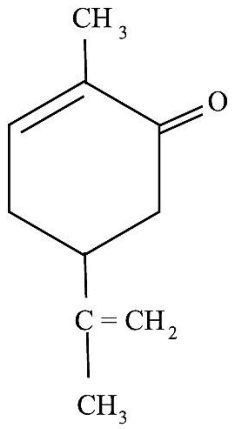
24 Propanol reacts with Tollen's reagent to produce

A silver and propanol.
B silver oxide and propanoic acid.
C silver nitrate and propanoic acid.
D silver and propanoic acid.

25 The structural formula of vanillin and carvone are shown:



Vanillin



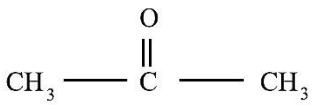
Carvone

Which reagents can be used to distinguish between vanillin and carvone?

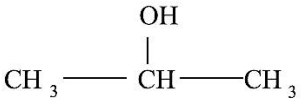
A aqueous bromine
B Fehling's solution
C alkaline aqueous bromine
D 2,4 dinitro-phenylhydrazine

26 Which compound, **A**, **B**,**C** or **D** is easily oxidised?

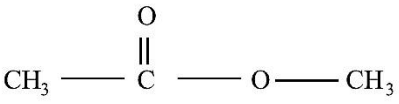
A



B

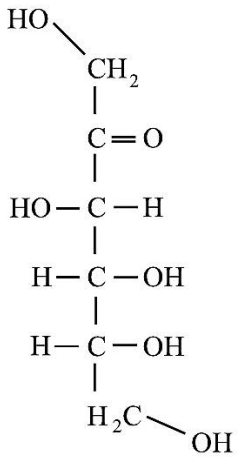


C



D

27 The diagram shows the structure of fructose.



fructose

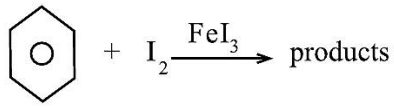
How many chiral carbon atoms are in fructose?

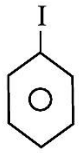
A 1
B 2
C 3
D 6

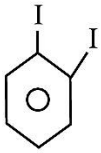
28 Which method of waste disposal is the most recommended?

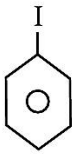
A incineration
B bioremediation
C reusing
D land filling

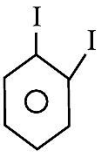
29 What are the correct products of the reaction shown?



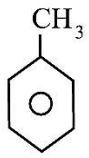
A  + HI

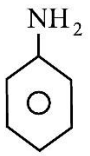
B  + H_2

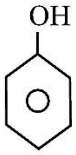
C  + H_2

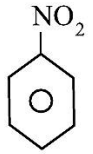
D  + HI

30 Which benzene derivative **A**, **B**, **C** or **D**is least reactive?

A 

B 

C 

D 

Section B

*For each of the questions in this section, one or more of the three numbered statements **1** to **3** may be correct.*

Decide whether each of the statements is or is not correct. (You may find it helpful to put a tick against the statement(s) which you consider to be correct).

*The responses **A** to **D** should be selected on the basis of*

A	B	C	D
***1,2** and **3** are correct*	***1** and **2** only are correct*	***2** and **3** only are correct*	***1** only is correct*

No other combination of statements is used as a correct response.

31 Which factor(s) affect(s) the standard electrode potential of a cell?

1. pressure
2. concentration
3. temperature

32 Which species has/ have an oxidation number of +3?

1. Al_2O_3
2. P_4O_6
3. $Cr_2O_7^{2-}$

33 Which organic substance rotates plane polarised light?

1. $CH_3(CHOH)_2CH_3$
2. $CH_3CHBrCH_2CH_3$
3. $CH_3CHOHCHClCH_3$

34 The reaction of a hydrocarbon is shown:

$$CH_3\,CH\,CH_2 + HCl \rightarrow X$$

What could be X?

1. 2 - chloropropane
2. a mixture of 2 - chloropropane and 1 - chloropropane
3. 1 - chloropropane

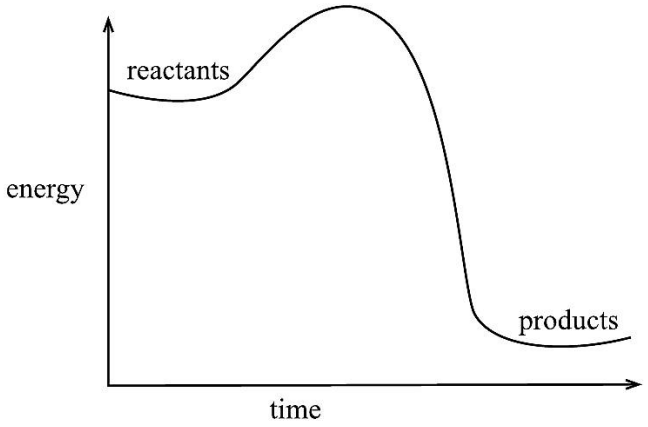
35 Which property of period 3 elements decreases with increasing atomic number?

1. atomic radii
2. easy of losing an electron by an atom
3. acidityof the oxides

36 Which species is/are nucleophile(s)

1. NH_4^+
2. NH_3
3. HSO_4^-

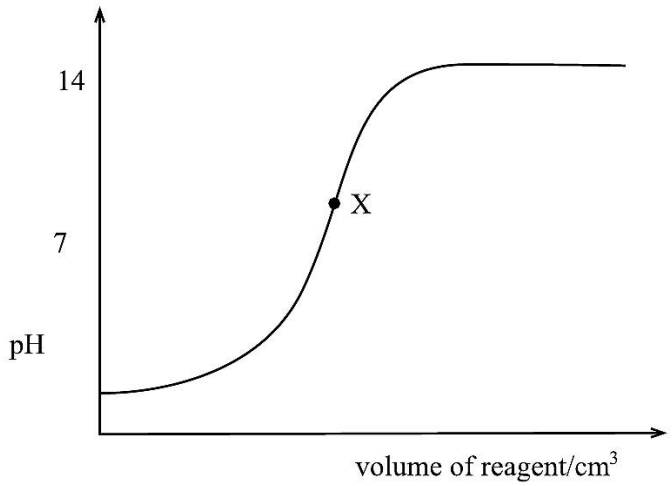
37 The graph shows how the energy changes as a reaction progresses.



Which statements about the reaction is/are correct?

1. the reaction is exothermic
2. the reaction is energetically feasible
3. the reaction is endothermic

38 The graph shows a titration curve.



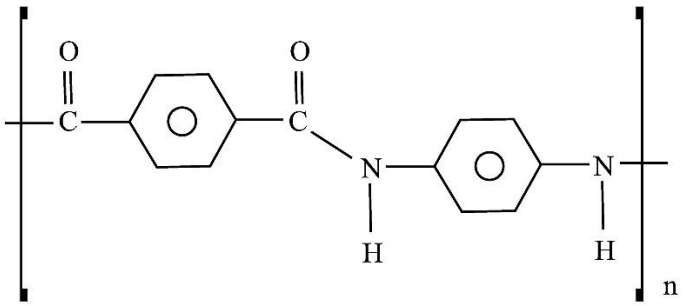
Which statement(s) about the titration is/are correct?

1. A strong acid is titrated with a strong base.
2. X is the equivalent point
3. The base is being added to the acid.

39 The catalytic effect of nano particles is due to their

1. large surface area to volume ratio
2. nanometer-scale sizes
3. low melting points

40 The structure of Kevlar is shown.



Which statement(s) about Kevlar is/are correct?

1. it is a condensation polymer
2. consists of two different monomers
3. It is a polyamide