EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Chemistry 5070/1
Paper 1 Multiple Choice

Friday  4 NOVEMBER 2016

Additional Materials:
Electronic calculator (non programmable) and/or Mathematical tables
Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

Time  1 hour

Instructions to Candidates

Do not open this question paper until you are told to do so.
Look at the left hand side of your answer sheet. Ensure that your name, the
school/centre name and subject paper are printed. Also ensure that the subject
code, paper number, centre code, your examination number and the year are printed
and shaded. Do not change the already printed information.
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 provided.
Read very carefully the instructions on the Answer Sheet.

Information for Candidates
Each correct answer will score one mark.
Any rough working should be done in this question paper.
The Periodic Table is printed on page 12.
Cell phones are not allowed in the examination room.
1. What are the basic units of matter in water?
   A. Atoms
   B. Electrons
   C. Ions
   D. Molecules

2. Which of the following is **not** a change of state?
   A. Condensation
   B. Filtration
   C. Sublimation
   D. Vaporization

3. Which piece of apparatus can be used to measure accurately 15.6 cm³ of solution?

   ![Apparatus Options]

4. The diagram below shows a chromatogram obtained using solutions A, B, C and D on one side and the dyes blue, green and red on the other side.

   ![Chromatogram Diagram]

   Which of the solutions A, B, C and D contains green and red dyes only?

5. The mixture which contains elements only is ...
   A. air.
   B. brass.
   C. mineral water.
   D. seawater.
6 The structure below represents a solid substance at r.t.p.

Which of the following substances is likely to have the structure above?
A  Aluminium
B  Calcium
C  Lithium
D  Magnesium

7 Elements A and D have atomic numbers 12 and 8 respectively. When A and D react together, the structure of the resulting compound is ...

8 Which of the following common substances contains ethanoic acid?
A  Cooking oil
B  Dish washing liquid
C  Jik
D  Vinegar

9 Which one of the following substances will neutralize both dilute hydrochloric acid and aqueous ammonia solutions?
A  Aluminium hydroxide
B  Copper (II) hydroxide
C  Iron (II) hydroxide
D  Magnesium hydroxide
10 Which of the following salts cannot be crystallized from an aqueous solution?
A  Barium Chloride
B  Magnesium Sulphate
C  Silver Chloride
D  Sodium Ethanoate

11 Which one of the following oxides has a pH of 7?
A  Calcium oxide
B  Hydrogen oxide
C  Sodium oxide
D  Magnesium oxide

12 A compound has the empirical formula of CH₂O and a relative molecular mass of 60. What is the molecular formula of this compound?
A  C₂H₄O
B  C₃H₄O₂
C  C₂H₄O₃
D  C₂H₄O₂

13 What mass of methane, CH₄, occupies the same volume, measured at r.t.p as 11g of carbon dioxide?
A  4g
B  16g
C  176g
D  264g

14 A solution was made by dissolving 14.0g of potassium hydroxide, KOH, to make 50cm³ of solution. What is the concentration of the solution in mol/dm³?
A  0.25
B  0.28
C  2.5
D  5.0

15 The equation of a chemical reaction is given below.

ₐ₆P₄(s) + b₆KClO₃(s) → c₆P₂O₅(s) + d₆KCl(s)

The underlined letters a, b, c and d represent numbers used to balance the equation. Which of the following is correct?

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<tr>
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<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
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</tbody>
</table>
16 One mole of hydrogen gas and one mole of water have an equal number of ...
   A atoms.
   B electrons.
   C ions.
   D molecules.

17 Hydrogen and chlorine gases react under suitable conditions as shown in the reversible chemical equation below.
   \[ \text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons 2\text{HCl}(\text{g}) \quad \Delta H = +184 \text{kJ/mol} \]

   Which one of the following changes will affect the position of the equilibrium?
   A Addition of a catalyst
   B Change of volume
   C Increase in temperature
   D Increase in pressure

18 A pupil prepared oxygen gas from potassium chlorate by using manganese (IV) oxide, MnO₂, as a catalyst. Which of the following graphs shows how the mass of manganese (IV) oxide changed with time during the reaction?
19 Curve 1 shows the volume of carbon dioxide gas given off when 8g of calcium carbonate lumps react completely with excess dilute hydrochloric acid at 20°C.

![Graph showing volume of carbon dioxide gas/cm³ vs Time/s]

Curve 2 could be produced by using ...
A 2g of powdered calcium carbonate.
B 3g of calcium carbonate lumps.
C a lower temperature.
D a more concentrated solution of the acid.

20 Some bond enthalpy in kJ/mol are shown in the table below.

<table>
<thead>
<tr>
<th>Bond</th>
<th>C – H</th>
<th>Cl – Cl</th>
<th>C – Cl</th>
<th>H – H</th>
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</thead>
<tbody>
<tr>
<td>Bond enthalpy in kJ/mol</td>
<td>413</td>
<td>242</td>
<td>346</td>
<td>436</td>
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</tbody>
</table>

Find the enthalpy change for the reaction below

\[ \text{CH}_4(\text{g}) + 2\text{Cl}_2(\text{g}) \rightarrow \text{CCl}_4(\text{g}) + 2\text{H}_2(\text{g}) \]

A +53.8kJ/mol
B -53.8kJ/mol
C -120kJ/mol
D +120kJ/mol

21 Which statement about a catalyst is correct? It ...
A increases the energy barrier of the reaction.
B lowers the energy barrier of the reaction.
C increases the bond energy of the reaction.
D lowers the bond energy of the reaction.

22 An element \textbf{E}, forms coloured compounds which are commonly used as catalysts. In which section of the Periodic Table is element \textbf{E} found?
A Alkali metals
B Halogens
C Noble gases
D Transition metals
23 The diagram below shows an outline of the Periodic Table.

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<tr>
<th></th>
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<th>W</th>
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<td>Y</td>
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</table>

Which of the following statements is correct?
A The melting point of X is higher than that of Z.
B X and Z can react to form a covalent compound XZ.
C Y reacts with oxygen to form an oxide with the formula, Y₃O₂.
D W reacts with an acid to form a salt and hydrogen gas.

24 An electrochemical cell was made by dipping a copper rod and a rod of metal P in dilute sulphuric acid according to the diagram below:

![Diagram of an electrochemical cell]

The bulb did not light up. What was metal P?
A Aluminium
B Copper
C Gold
D Zinc

25 Dilute copper (II) sulphate solution was electrolyzed using inert electrodes. Find the quantities for the electrode products if 0.2 moles of electrons were used at r.t.p.

<table>
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<th>Cathode</th>
<th>Anode</th>
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<tr>
<td>A 4.8dm³ of hydrogen gas</td>
<td>1.2dm³ of oxygen gas</td>
</tr>
<tr>
<td>B 2.4dm³ of hydrogen gas</td>
<td>4.8dm³ of oxygen gas</td>
</tr>
<tr>
<td>C 2.4g of copper</td>
<td>4.8dm³ of oxygen gas</td>
</tr>
<tr>
<td>D 6.4g of copper</td>
<td>1.2dm³ of oxygen gas</td>
</tr>
</tbody>
</table>
26 The apparatus below shows the electrolysis of concentrated sodium chloride solution using carbon electrodes.

What took place at the cathode?
A  Sodium ions were oxidized.
B  Sodium ions were reduced.
C  Hydrogen ions were reduced.
D  Hydrogen ions were oxidized.

27 Which of the following is true about mercury? It ...
A  is an insulator.
B  is an electrolyte.
C  conducts electricity by the movement of ions.
D  conducts electricity by movement of electrons.

28 Mild steel is an alloy of two elements. What are these elements?
A  Copper and Tin
B  Copper and Zinc
C  Iron and Tin
D  Iron and Carbon

29 In the laboratory, an experiment was set up as shown in the diagram below.

Which of the following is the correct equation for the reaction in the above experiment?
A  \( \text{Zn} + \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H} \)
B  \( 2\text{Zn} + \text{HCl} \rightarrow 2\text{ZnCl} + \text{H}_2 \)
C  \( \text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2 \)
D  \( \text{Zn} + \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2 \)
30 Which of the following metals forms the least stable nitrate?
A Aluminium
B Copper
C Silver
D Sodium

31 A powdered mixture of metals contains magnesium, copper, iron and zinc. Excess dilute sulphuric acid is added until no more reaction occurs. What is the residue left in the reaction vessel?
A Copper
B Iron
C Magnesium
D Zinc

32 The diagram below shows the preparation of Sulphur dioxide gas.

Which of the following methods can be used to collect Sulphur dioxide gas?
A Downward displacement of water.
B Downward displacement of air.
C Upward displacement of air.
D Upward delivery of the gas.

33 The source of nitrogen used in the manufacture of ammonia using the Haber process is ...
A fractional distillation of liquid air.
B the decomposition of organic matter.
C the decomposition of ammonium nitrate.
D the electrolysis of water.

34 Which of the following fuels is environmental friendly?
A Coal
B Ethanol
C Hydrogen
D Petrol
35 Which method of rust prevention does not involve coating the iron or steel object?
   A  Alloying
   B  Electroplating
   C  Galvanising
   D  Painting

36 Which set of polymers comprises natural polymers?
   A  Protein, fats and nylon.
   B  Protein, fats and cellulose.
   C  Protein, cellulose and nylon.
   D  Nylon, cellulose and fats.

37 Which type of reaction occurs when glucose is formed from starch?
   A  Polymerization
   B  Hydrólisis
   C  Fermentation
   D  Cracking

38 A compound has the following structure.

\[
\text{H} \quad \text{C} = \text{C} \quad \text{H} \quad \text{C} - \text{C} - \text{H} \\
\text{H} \quad \text{O} \quad \text{H}
\]

Which of the reactions below will this compound undergo?
   1. It will react with methanoic acid to form an ester
   2. It will decolourise bromine water rapidly
   3. It will react with an alkali to form a salt
   A  1, 2 and 3
   B  2 and 3 only
   C  1 and 2 only
   D  1 only

39 Which of the following plastics is thermally stable?
   A  Poly(ethene)
   B  Poly(propene)
   C  Poly(vinylchloride)
   D  Poly(tetrafluoroethene)
An organic compound, \( R \), has an empirical formula, \( \text{CH}_2\text{O} \). \( R \) gives out carbon dioxide from marble chips. Which of the following is the structure of compound \( R \)?

A
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\begin{array}{c}
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\text{O} \\
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*58-71 Lanthanoid series
+90-103 Actinoid series

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**Key**

- a = relative atomic mass
- X = atomic symbol
- b = proton (atomic) number

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The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

\[ \text{NA} = 6.0 \times 10^{23}/\text{mol}, \quad 1\text{F} = 96500\text{C}. \]

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