THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

032/1

CHEMISTRY 1
(For Private Candidates Only)

Time: 3 Hours

Thursday, 26th November 2015 a.m.

Instructions

1. This paper consists of sections A, B and C.
2. Answer **all** questions in this paper.
3. Calculators and cellular phones are **not** allowed in the examination room.
4. Write your **Examination Number** on every page of your answer booklet(s).
5. The following constants may be used.

   Atomic masses:

   H = 1, Li = 7, C = 12, O = 16, Na = 23, Al = 26, Cl = 35.5,

   Ca = 40, Ag = 108, Ba = 137.

   Avogadro's number = 6.02×10^{23}.

   GMV at s.t.p = 22.4 dm^3.

   1 faraday = 96,500 coulombs.

   Standard pressure = 760 mm Hg.

   Standard temperature = 273 K.

   1 litre = 1 dm^3 = 1000 cm^3.

SECTION A (20 Marks)

Answer all questions in this section.

1. For each of the items (i) – (x), choose the correct answer from the given alternatives and write its letter beside the item number in the answer booklet provided.

(i) Which of the following transform a mechanical energy to an electric energy?
A Hydroelectric power plant
B An electric motor
C Solar panels
D An electric cooker
E A motor cycle wheel.

(ii) Organic compounds with general formula RCOOH is known as
A Aldehydes B Carboxylic acid C Hydrocarbons
D Esters E Alcohols.

(iii) Which of the following will increase the equilibrium yield of hydrogen in the equation, $CH_{4(g)} + H_2O_{(g)} \rightleftharpoons CO_{(g)} + 3H_{2(g)} \quad -\Delta H$.
A Decrease the temperature
B Increase the pressure
C Decrease the surface area of methane
D Decrease the methane concentration
E Addition of catalyst.

(iv) Sodium atom and sodium ion have the same
A electronic configuration B number of electrons
C chemical properties D number of protons
E charge.

(v) The three basic components of an atom are
A protons, neutrons and ions B protons, neutrons and electrons
C protons, neutrons and nucleus D protons, neutrinos and ions
E protium, nucleons and tritium.

(vi) Which of the following is an example of oxide of metal used in liming?
A Al_2O_3 B Na_2O C CO_2
D CaO E CuO.

(vii) The quantity of electricity needed to deposit 0.5 moles of aluminium in the electrolysis o aluminium chloride is
A 144750 Coulombs B 289500 Coulombs C 3865000 Coulombs
D 96500 Coulombs E 193000 Coulombs.

(viii) Which of the following represents a redox reaction?
A $Br_2 + 2Na \longrightarrow 2NaBr$ B $K \longrightarrow K^+ + e$
C $NaOH + HCl \longrightarrow NaCl + H_2O$ D $Cl_2 + 2e \longrightarrow 2Cl$
E $AgNO_3 + KBr \longrightarrow AgBr + KNO_3$.

(ix) Which process does not result in the formation of both carbon dioxide and water?
A Addition of dilute acid to a carbonate
B Burning of ethanol
C Burning of methane
D Heating $Na_2CO_3.10H_2O_{(s)}$
E Burning of ethane.

(x) Which two reagents could be used to prepare an insoluble salt of copper (II) carbonate?
A $CuO_{(s)}$ and $Na_2CO_{3(aq)}$
B $CuO_{(s)}$ and $MgCO_{3(s)}$
C $CuSO_{4(aq)}$ and $Na_2CO_{3(aq)}$
D $CuSO_{4(aq)}$ and $MgCO_{3(s)}$
E $CuCl_{2(aq)}$ and $CaCO_{3(s)}$

2. Match the items in **List A** with the responses in **List B** by writing the letter of the correct response beside the item number in the answer booklet provided.

List A	List B
(i) It burns in air to produce carbon dioxide and water.	A Ammonia
(ii) It is used to identify the presence of nitrate ions.	B Iron (II) sulphate
(iii) It is used to identify presence of calcium ion.	C Sulphuric acid
(iv) It is a yellow crystalline.	D Calcium hydroxide
(v) It is an insoluble powder in water, but soluble in organic solvent.	E Hydrogen sulphide
(vi) It is used to identify sulphate ions.	F Silver nitrate
(vii) It is used to identify carbonate ions.	G Rhombic sulphur
(viii) It forms white fumes with hydrogen chloride.	H Ammonium oxalate
(ix) It blackens lead acetate paper.	I Nitrogen dioxide
(x) It is used to identify halide ions.	J Methane
	K Sulphur
	L Nitrogen
	M Carbon dioxide
	N Barium chloride
	O Ammonium chloride

SECTION B (54 Marks)

Answer **all** questions in this section.

3. (a) *Identify the types of bonds found in each of the following compounds:*
(i) NaCl
(ii) O_2
(iii) Cl_2.

(b) *Briefly explain how sulphur dioxide causes pollution and how this harms trees.*

4. (a) In a certain experiment, the following results were obtained 69.58% Ba, 6.09% C, 24.32% O. Calculate the empirical formula for the compound.

(b) List two environmental problems that are associated with the disposal of plastics.

5. (a) Calculate the number of moles of sodium chloride present in 22 cm^3 of 2 M solution.

(b) 2.5 g of calcium carbonate was dropped into a beaker containing dilute hydrochloric acid. Write the ionic equation for the reaction and calculate the loss in mass of calcium carbonate.

6. (a) Briefly explain how the following led to soil erosion and destruction of soil structure:
   (i) Overgrazing
   (ii) Overstocking
   (iii) Deforestation.

(b) The electronic arrangement of ions of x^{3+} and y^{2-} are 2.8 and 2.8.8 respectively. Write the
   (i) electronic arrangement of their atoms.
   (ii) formula of the compound formed between x and y.

7. (a) Briefly explain three effects of using charcoal as a source of energy to the environment.

(b) Describe what would be observed in each of the following experiments and write equations for the reactions that occur.
   (i) Aqueous sodium hydroxide is added to aqueous copper (II) sulphate.
   (ii) Copper (II) nitrate crystals are heated strongly.

8. (a) Briefly explain the meaning of the following and give an example in each case.
   (i) Addition reaction.
   (ii) Substitution reaction.

(b) Write the procedure required to prove the presence of temporary or permanent hardness of water.

9. (a) The Frasch process in the extraction of sulphur is essentially a physical process. Justify the statement.

(b) Briefly explain, what will happen when the following salts are heated strongly?
   (i) Hydrated iron (II) sulphate.
   (ii) Iron (III) sulphate.
   (iii) Ammonium carbonate.

10. (a) State two uses for each of the following:
   (i) Graphite.
   (ii) Diamond.

(b) Indicate whether a chemical or physical changes is involved in the following process:
   (i) Addition of sodium metal to water.
   (ii) Heating magnesium in air.

11. (a) When zinc granules and dilute sulphuric acid are reacted together, a gas is produced and is collected by downward displacement of water.
(i) Briefly explain, why the gas is collected by downward displacement of water?
(ii) Name the gas produced. hydrogen gas

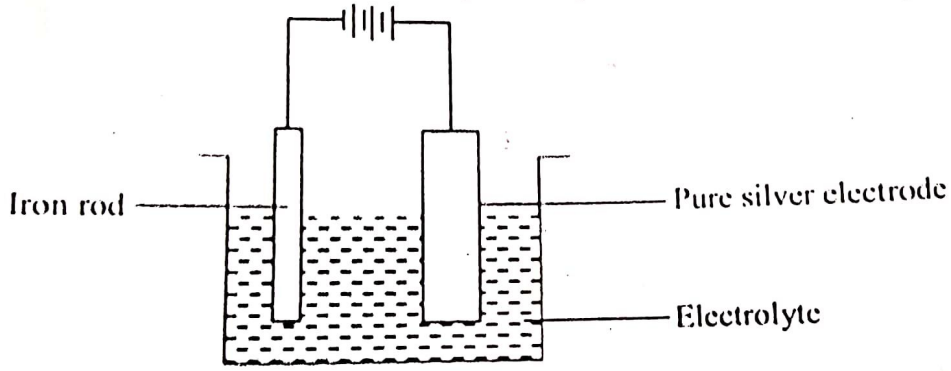
(b) In the Haber process, nitrogen and hydrogen react to produce ammonia,
$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ $\Delta H = -92.4kJ$. Using Le Chatelier's principle, state whether you would use high temperature, low temperature, high pressure or low pressure in order to favour the production of ammonia. Give reasons for your choice of conditions.

SECTION C (26 Marks)

Answer **all** questions in this section.

12. Soil fertility plays a vital role in agricultural activities. Based on this statement, explain three ways of maintaining soil fertility and four ways in which soil can lose its fertility.

13. The following diagram represents an experiment whose aim was to electroplate an iron rod with silver metal. The solution contained K^+, Ag^+ and CN^- ions.



(a) Which electrode was used as anode?
(b) Which process took place at the anode?
(c) State three importance of this experiment.
(d) If after passing a constant current for 400 minutes, the iron rod gained 2.16 g of silver Calculate the number of coulombs and the current which passed during the experiment.