*Candidate's Examination Number ……*

**THE UNITED REPUBLIC OF TANZANIA**
**NATIONAL EXAMINATIONS COUNCIL**
**FORM TWO SECONDARY EDUCATION EXAMINATION, 2011**

**0032** **CHEMISTRY**

**Time: 2½ HOURS**

**INSTRUCTIONS**

1. This paper consists of sections A, B and C.
2. Answer **ALL** questions.
3. Write your examination number at the top right corner of every page.
4. **ALL** writing must be in black or blue ink **EXCEPT** diagrams which must be in pencil.
5. Cellphones and calculators are not allowed in the examination room.
6. The following atomic masses may be used: $H = 1$, $O = 16$, $C = 12$, $Na = 23$, $S = 32$, $Ca = 40$

| **FOR EXAMINER'S USE ONLY** | | |
|---|---|---|
| **QUESTION NUMBER** | **SCORE** | **INITIALS OF EXAMINER** |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| **TOTAL** | | |

This paper consists of 8 printed pages.

## SECTION A (10 MARKS)

1. Write the letter of the correct answer from the give alternatives in the box provided.

(i) Isotopes are atoms of the same element that have different:
A. Atomic number
B. Electron arrangement
C. Mass number
D. Protons

(ii) When substance A and substance B react to produce a new substance C, the reactants A and B are said to:
A. Be miscible
B. Form a mixture
C. Form a solution
D. Undergo chemical change

(iii) In the formula of the compound $F_2K_3$, the valences of F and K are respectively:
A. 2 and 3
B. 3 and 2
C. 4 and 6
D. 6 and 4

(iv) The process by which water is converted into water vapour or steam is called:
A. Condensation
B. Evaporation
C. Precipitation
D. Transpiration

(v) In the Bunsen burner, a sooty flame is most likely to be formed when the:
A. Air holes are fully closed
B. Air holes are opened
C. Flame is noisy
D. Flame is smaller and hotter

(vi) The best way to separate a mixture of iodine and iron filings is by:
A. Decantation
B. Evaporation to dryness
C. Fractional distillation
D. Sublimation

(vii) The choice of the source of heat depends on the:
A. Colour of the flame
B. Quantity of heat produced
C. Substance to be burned or boiled
D. Type and shape of flame

(viii) When oxygen combines with metals they:
A. Form metallic oxides

B. Form precipitates
C. Rust
D. Sublime

(ix) The pair of elements which is most likely to form a covalent bond when they react together is:
A. Carbon and oxygen
B. Magnesium and potassium
C. Nitrogen and aluminium
D. Sodium and oxygen

(x) A calcium ion ($Ca^{2+}$) differs from a calcium atom (Ca) because a calcium ion has:
A. Less electrons
B. Less protons
C. More electrons
D. More neutrons

2. Match each item in List A with a correct response in List B by writing its letter below the number of the corresponding item in the table provided.

| LIST A | LIST B |
|---|---|
| (i) Burning gases that give out heat and light | A. Boiling and filtration |
| (ii) Coating iron objects using zinc metal | B. Class C fire |
| (iii) Domestic water treatment and purification | C. Distillation |
| (iv) Heterogeneous mixture | D. Energy shell 1 |
| (v) Holds maximum of 8 electrons | E. Energy shell 2 |
| (vi) Intelligent guess on the cause of the problem | F. Experimentation |
| (vii) Liquid metal | G. Flame |
| (viii) Relights a glowing splint | H. Galvanization |
| (ix) The burning material is a liquefied gas | I. Hydrogen |
| (x) Turns white anhydrous copper (II) sulphate blue | J. Hypothesis |
| | K. Mercury |
| | L. Oxygen |
| | M. Solution |
| | N. Suspension |
| | O. Water |

**Answers:**

| LIST A | i | ii | iii | iv | v | vi | vii | viii | ix | x |
|---|---|---|---|---|---|---|---|---|---|---|
| LIST B | | | | | | | | | | |

## SECTION C

3. (a) Why do atoms combine?

   (b) A metal Z with atomic number 12 combines with chlorine to produce a metal chloride. By means of diagrams, illustrate the arrangement of electrons in Z before and after the reaction.

   (c) An atom X of atomic number 14 combines with chlorine to form a chloride. What type of bond will be formed between the atoms?

4. (a) What do you understand by the term "valency"?

   (b) Calculate the oxidation number of the underlined elements:

   (i) NaOH

   (ii) $CO_3^{2-}$

   (iii) $Na_3PO_4$

   (iv) $SO_2$

   (c) Explain three points on the importance of changing one state of matter to another.

5. (a) Give two reasons why water is a compound.

   (b) Write IUPAC names for each of the following compounds:

   (i) $CaCO_3$

   (ii) $Al_2(SO_4)_3$

   (iii) $NaHCO_3$

   (iv) $Mg(NO_3)_2$

   (v) KCl

   (c) Describe a chemical test for water.

6. (a) State the law of conservation of energy.

   (b) Give two ways in which energy can be transformed from one form to another.

   (c) List down two sources of heat in the laboratory.

7. (a) Define the term "empirical formula".

   (b) An organic compound contains 26.7% carbon, 2.2% hydrogen, and 71.1% oxygen. If its relative molecular mass is 90, determine its:

   (i) Empirical formula

(ii) Molecular formula

(c) State three points of modern atomic theory that amend Dalton's ideas.

8. (a) Differentiate between:

(i) An atom and an element

(ii) Combustion and rusting

(iii) A solute and a solvent

(iv) A compound and a mixture

(b) Give two applications of chemistry in everyday life.

(c) Why most laboratory apparatuses are made of glass?

9. (a) Below is part of the periodic table and the numbers represent atomic numbers. Study the table carefully then answer the questions that follow:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | | | | | | |

(i) Write T in the space where a noble gas in period 3 would occupy.

(ii) Write U in the space where the most active metal would occupy.

(iii) Write W in the space where the most active non-metal would occupy.

(iv) Write X in the space which would be occupied by an element in period 3 capable of forming a compound XW.

(v) Write Y in group II period 4 element.

(vi) Write Z in group VI period 3 element.

(b) Write the chemical symbols of the following elements:

(i) Argon

(ii) Sulphur

(iii) Boron

(iv) Silicon

(v) Phosphorus

(c) Write the formula of each compound formed between:

(i) Aluminium and chlorine

(ii) Potassium and oxygen

10. (a) (i) Name two reagents normally used for preparation of hydrogen in the laboratory.

(ii) Write a word equation for the reaction in (i) above.

(b) (i) Why is hydrogen gas used for filling balloons?

(ii) Describe a chemical test for hydrogen gas.

(c) Explain safety measures that should be taken when handling chemicals with the following warnings:

(i) Flammable

(ii) Corrosive

(iii) Irritant or Harmful

(iv) Toxic