

# TOPICAL EXAMINATION

CLASS: FORM TWO

TOPIC: ATOMIC STRUCTURE

TIME: 2 HRS

INSTRUCTIONS:-

1. *This paper consists of sections A and B*
2. *Answer all questions*
3. *All writings should be in blue/black ink except for drawings that should be in pencil*

## SECTION A

1. Choose and write the letter of the best answer in each of the multiples choices:
  - i. What is so unique about a hydrogen atom on comparing it with other elements?
    - A. It has no neutron in its nucleus
    - B. It has a small relative atomic mass
    - C. It forms a low density gas
    - D. It has no exact place in the Periodic table
  - ii. What is so special with Francium and Fluorine compared to other elements in the periodic table?
    - A. Francium is a liquid and Fluorine is a gas
    - B. Francium is in group 1 and Fluorine in group 7
    - C. Francium is in periodic 7 and Fluorine in period 2
    - D. Francium is most electropositive and Fluorine most electronegative.
  - iii. Which of the following group of gases are monoatomic at room temperature?
    - A. Noble gases
    - B. Gases of group 6 and 7
    - C. Ammonia and nitrogen
    - D. Hydrogen and phosphine
  - iv. An atom T has 12 electrons and atom Z has 17 electrons. When the two atoms react to form a compound the formula of the resulting compound will be:-
    - A.  $TZ_2$
    - B.  $T_2Z$
    - C.  $T_2Z_3$
    - D.  $T_3Z_2$
  - v. An element T with electronic configuration 2: 8: 3 belongs to group ..... and period .....
    - A. 11 and 3
    - B. 11 and 3
    - C. 11 and 2

- D. 11 and 2
- vi. Give an arbitrary 16X: its electronic configuration is .....
- A. 2: 8: 3  
 B. 2: 8: 4  
 C. 2: 8: 6  
 D. 2: 10: 4
- vii. Hydrogen is placed in group 1 elements because .....
- A. It is a metal  
 B. It loses electron to form compounds  
 C. It is an inert gas  
 D. Its atomic number is 1
- viii. What are nucleons?
- A. Neutrons  
 B. Neutrons and protons  
 C. Electrons  
 D. Protons, Neutrons and electrons
- ix. Most atoms are neutral because. ....
- A. the nucleus is only made up of neutrons  
 B. there are equal number of electrons and protons in the shells  
 C. the neutrons normally have zero charge.  
 D. the number of electrons balances out the number of protons in the atom.
- x. The maximum number of electronic in the innermost shell of an atom is .....
- A. 3      B. 1      C. 4      D. 2

2. Match the items of COLUMN A to the statements of COLUMN B to make a meaningful scientific idea or statement.

Column A	Column B
i. Sub shells	A. K,L,M,N,O,P,Q,
ii. Maximum number of electrons in the M-shell	B. s,p,d,f. C. A – Z D. P + n
iii. Electronic formula	E. Discovered electrons
iv. Mass number	F. Discovered isotopes
v. Sub atomic particles	G. +
vi. Fredrick soddy	H. O
vii. Relative charge of a neutron	I. I
viii. Relative approximate mass of proton	J. Orbital K. 9F; 2, 8, 1 L. I F.
ix. Has two protons	M. Beryllium
x. A home for an electron.	N. Helium O. 8

**SECTION B**

3. (a) Which are the three sub – atomic particles;  
 i. .... (ii) ..... (iii) .....
- (b) Which sub – atomic particles from the nucleus and what is their common name?  
 Particles (i) ..... (ii) .....  
 Common name .....
4. (a) Write the electronic configuration of the following elements;  
 $_{11}\text{Na}$ : .....  
 $_{20}\text{Ca}$ : .....  
 $_{17}\text{Cl}$ : .....
- (b) Derive the periods and groups of the above elements from their electronic configurations;  

Element	Group	Period
Na		
Ca		
Cl		
5. Atoms of the same element are identical (=all alike in properties have same mass and size);  
 Name the person who developed the above theory;  
 .....
- a. Did this theory face any challenge? Explain  
 .....
- b. How can you derive a molecule formula from an empirical formula. A certain compound contains 22.7% zinc, 11.0% sulphur, 22.3% oxygen and the rest water of crystallization. Derive the systematic name of the chemical formula of the compound if its relative atomic mass, Ar is 287. (Zn = 65, O = 16, H = 1, S = 32).
6. (a) Calculate relative atomic mass of Boron if the percentage relative abundances of its isotopes are as follows;  
 $\text{B} - 10$  is 75% and  $\text{B} - 11$  is 25%  
 .....
- (b) Calculate the formula mass of the following compounds;  
 $\text{Na}_2\text{CO}_3$ ,  $\text{HCl}$  and  $\text{H}_2\text{SO}_4$

[S = 32, H = 1, C = 12, Na = 23, O = 16, Cl = 35.5]

- .....  
.....
7. An atom of an element X is represented as  ${}_{11}^{23}\text{X}$
- i. What does the numeral 23 indicate? .....
  - ii. What does the numeral 11 indicate? .....
  - iii. What is the number of protons in X? .....
  - iv. What is the number of electrons in X? .....
  - v. What is the number of neutrons in X? .....
8. a. Isotopes of oxygen, and their abundances 99.760%, 0.030% and 0.202%.  
Find R.A.M.
- b. Define the following terms;
- i. An atom  
.....  
.....
  - ii. An element  
.....  
.....
  - iii. Isotopy  
.....  
.....
  - iv. Atomic number  
.....  
.....
  - v. Electronic configuration  
.....  
.....
9. (a) Give the IUPAC names for each of the following compounds:-  
i.  $\text{Cu}_2\text{O}$   
ii.  $\text{Na}_2\text{SO}_4$   
iii.  $\text{Fe}_2\text{O}_3$
- (b) Calculate the oxidation number of underlined elements:-  
(i)  $\underline{\text{C}}\text{O}_2$  (ii)  $\text{H}\underline{\text{C}}\text{O}_3$  (iii)  $\text{K}\underline{\text{C}}\underline{\text{l}}\text{O}_3$
- (c) Write the electronic configuration of Cl- and hence draw its electronic diagram.

10. (a) Define:
- i. Empirical formula  
.....  
.....
  - ii. Molecular formula  
.....  
.....
- (b) A certain gaseous compound contains 82.8% of carbon and 17.2% of hydrogen by mass. The vapour density of the compound is 29. Calculate its molecular formula (C = 12, H = 1)