

**FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2009**

(CSS Programme)

Chemistry

**CH I B 01—FOUNDATIONS IN CHEMISTRY**

Time : Three Hours

Maximum Weightage : 30

I. Answer *all* the 12 questions. These include multiple choice, fill in the blank and answer in a word questions. Each question carries a weightage of  $\frac{1}{4}$ .

1 The isotope  ${}_{11}^{24}\text{Na}$  is likely to emit :

- (a) Alpha particle. (b) Positron.  
(c) Beta particle. (d) deuteron.

2 Which group in the periodic table will be occupied by the daughter element formed by the emission of an  $\alpha$ -particle from  ${}_{92}^{238}\text{U}$  ?

- (a) Group III. (b) Group II.  
(c) Group I. (d) Group W.

3 The maximum number of elements that can be accommodated in the 7th period of the periodic table is :

- (a) 32. (b) 40.  
(c) 50. (d) 72.

4 Which of the following elements has the smallest ionization enthalpy among them ?

- (a) Beryllium. (b) Boron.  
(c) Carbon. (d) Nitrogen.

5 Which of the following is *not* an anomalous behaviour of lithium ?

- (a)  $\text{LiOH}$  is insoluble in water.  
(b)  $\text{Li}_2\text{CO}_3$  decomposes on heating.  
(c) **On heating in air, lithium forms lithium nitride.**  
(d)  **$\text{LiCl}$  is more covalent than  $\text{NaCl}$ .**

6 Among the halogens, the highest electron affinity (only magnitude) is that of :

- (a) Fluorine. (b) Chlorine.  
(c) Bromine. (d) Iodine.

**Turn over**

7 Which of the following is a metalloid ?

- (a) Carbon. (b) Phosphorus.  
(c) Bromine. (d) Arsenic.

8 The purity of an organic solid can be conveniently tested using its :

- (a) Density. (b) Viscosity.  
(c) Melting point. (d) Colour.

9 Natural rubber is a polymer of :

- (a) 2-methyl - 1, 3 - butadiene. (b) **2-chloro** - 1, 3 - butadiene.  
(c) 2, **3-dimethyl** - 1,3-butadiene. (d) 2 - **chloro** - 3 - methyl - 1, 3- butadiene.

10 The decay constant of a radioisotope is related to its half life period as. \_\_\_\_\_

11 A hypothesis will be elevated to a \_\_\_\_\_ when it is abundantly supported with experiment.

12 In the nuclear reaction,



$$(12 \times \frac{1}{4} = 3)$$

II. Answer *all* the 9 questions. These are short answer type questions. Each question has a weightage 1.

13 How do observations lead to hypothesis ?

14 What are solar cells ?

15 What is the "Vital force theory" ?

16 Define covalent radius.

17 What is diagonal relationship due to ?

18 Give the electronic configuration of the element with atomic number 51 and identify the period and group of the element in the periodic table.

19 State and explain the Geiger-Nuttal rule.

20 What is K-electron capture ?

21 Mention *one* radioisotope used in medicine and give its specific use.

**(9 x 1 = 9)**

III. Answer any *five* questions. These are short essay questions. Each question has a **weightage** of 2.

- 22 What is N/P ratio ? How does it influence radioactive emissions ?
- 23 A particular rock sample contains uranium - 238 and lead - 206 in the mass ratio 1 : 0.433. Calculate the age of the rock, if the half life of uranium - 238 is  $4.5 \times 10^9$  years.
- 24 What is screening effect ? Discuss the Slater's rules for calculating the effective nuclear charge.
- 25 Discuss the **Pauling Scale of electronegativity**.
- 26 List the unique properties of water and explain the cause for each of these properties.
- 27 Give an account of the different types of structural isomerism **exhibited** by organic compounds.
- 28 How is ionic bond formed ? What are the characteristic properties of ionic compounds ?
- (5 x 2 = 10)

IV. Answer any *two* questions. These are essay questions. Each question has a **weightage** 4.

- 29 (a) The masses of a proton and a neutron are 1.0078 and 1.0082 **amu**. If the atomic mass of carbon is 12, calculate the binding energy per nucleon of carbon - 12.
- (b) Define ionization enthalpy. Discuss its variation along a period and along a group in the periodic table.
- 30 Outline the differences between metals, non-metals and metalloids.
- 31 Discuss the importance of the following in modern world :
- (a) Superconductors. (b) Nano science.
- (c) Genetic engineering.

(2 x 4 = 8)