D 3025 ✓   (Pages : 3)   Name...........................

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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 ¼.

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

    (a) Alpha particle.   (b) Positron.

    (c) Beta particle.   (d) deutron.

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

    (a) Grop III.   (b) Group II.

    (c) Group I.   (d) Group IV.

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) LiOH is insoluble in water.

    (b) $Li_2 CO_3$ decomposes on heating.

    (c) On heating in air, lithium forms lithium nitride.

    (d) Li Cl is more covalent than NaCl.

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

    (a) Fluorine.   (b) Chlorine.

    (c) Bromine.   (d) Iodine.

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,

    $_4^9Be + X \rightarrow \ _6^{12}C + _0^1n$, what is X ?
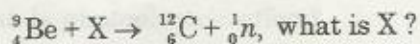
                                                        $(12 \times \frac{1}{4} = 3)$

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.

                                                        $(9 \times 1 = 9)$

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 4.5×10^9 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 exhibitted by organic compounds.

28 How is ionic bond formed ? What are the characteristic properties of ionic compounds ?

$(5 \times 2 = 10)$

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.

$(2 \times 4 = 8)$