

**SECOND SEMESTER B.Sc. DEGREE (SUPPLEMENTARY)
EXAMINATION, DECEMBER 2012**

(CCSS)

Chemistry

CH2 C03—PHYSICAL CHEMISTRY—1

Time : Three Hours

Maximum : 30 Weightage

I. Answer all the *twelve* questions. Each question carries a **weightage** of $\frac{1}{4}$. This section contains multiple choice, fill in the blanks and one word answer type questions.

1 The unit of energy is :

- (a) S^{-1} . (b) cm^{-1} .
(c) MeV. (d) A.

2 Which among the following is **NMR** active ?

- (a) (b) 2_6C .
(c) ${}^{18}_8O$. (d) 120 .

3 The radio waves are utilized in _____ spectroscopy.

- (a) Vibrational. (b) Electronic.
(c) Rotational. (d) **NMR**.

4 There are _____ types of primitive unit cells among crystals.

5 The number of atoms in a unit cell of a simple cubic lattice is _____

6 There are _____ types of space lattices in cubic crystals.

7 The radioactive nucleus used in the treatment of thyroid cancer is _____

- (a) ${}^{60}Co$. (b) ${}^{131}I$.
(c) ${}^{131}I$. (d) ${}^{60}Co$.

8 The most penetrating ray is :

- (a) α . (b) β .
(c) γ . (d) None of the above.

9 Which among the following is true ?

- (a) Order cannot be zero. (b) Order can be zero.
(c) Order is a theoretical concept. (d) Order cannot have fractional value.

10 The unit of rate constant of zero order reaction is :

- (a) $\text{mol L}^{-1} \text{S}^{-1}$. (b) mol
(c) $\text{L}^2 \text{mol}^{-1} \text{S}^{-1}$. (d) L mol

11 The catalyst used in the Haber process of manufacture of ammonia is _____

12 The intensity of monochromatic radiation _____ with increase in concentration of the absorbing medium.

(12 x = 3 weightage)

II. Answer *all nine* questions. Each question carries a **weightage** of 1.

13 What are the two factors that determine the intensity of spectral lines ?

14 Why amorphous substances are said to be isotropic ?

15 What are liquid crystals ? How are they classified ?

16 What are point defects ? Give *two* examples.

17 What is meant by mass defect ?

18 What is nuclear fission ? Give an example.

19 What is meant by **heterogenous** catalysis ? Give one example.

20 The rate constant of a reaction is $5.7 \times 10^{-3} \text{ L mol}^{-1} \text{S}^{-1}$ at 25°C and $1.64 \times 10^{-2} \text{ L mol}^{-1} \text{S}^{-1}$ at 40°C . Calculate the activation energy.

21 Distinguish between order and **molecularity**.

(9 x 1 = 9 weightage)

III. Answer any *five* questions. Each question carries a **weightage** of 2 :

22 Give a brief account of the width of spectral line.

23 Explain chemical shift.

24 Determine the Miller indices of crystal planes which cut through the crystal axes at :

(a) $(-2a, -3b, -3c)$.

(b) (a, b, c) .

25 Briefly explain the structure of NaCl crystal.

26 Calculate the binding energy per nucleon of oxygen atom $^{16}_8\text{O}$ which has a mass of 15.994910 a.m.u. Mass of neutron = 1.008655 a.m.u. Mass of proton = 1.007277 a.m.u. and mass of electron = 0.0005486 a.m.u.

27 Write notes on the influence of temperature on reaction rates.

28 Derive an expression for the rate constant of a second order reaction.

(5 x 2 = 10 weightage)

IV Answer any *two* questions. Each carries a weightage of 4 :

29 Describe the principle and applications of IR spectroscopy.

30 Give a detailed account on the powder X-ray diffraction method to study the structure of crystals.

31 Discuss the Collision theory of reaction rates.

(2 x 4 = 8 weightage)