

C 41825

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Name.....

Reg. No.....

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL/MAY 2013

(CCSS)

Chemistry

CH2 CO3—PHYSICAL CHEMISTRY

Time : Three Hours

Maximum : 30 Weightage

Section A

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 Which among the following has the highest frequency ?
(a) Radio waves (b) Micro waves.
(c) UV. (d) IR.
- 2 The number of modes of vibration possible for a linear triatomic molecule is _____.
- 3 Among the following which is microwave active ?
(a) H_2 . (b) N_2 .
(c) O_2 . (d) HCl.
- 4 What is the number of atoms per unit cell of crystal with bcc ?
- 5 To which type of Bravais lattice does Na Cl belong ?
- 6 $^{31}_{15}P$ and $^{32}_{16}P$ are.
(a) Isotopes. (b) Isobars.
(c) Isotones. (d) Isomers.
- 7 Give an example for an isotropic substance.
- 8 The rate constant K of a reaction is $2 \times 10^{-5} s^{-1}$. The order of the reaction is _____.
- 9 Energy corresponding to one mole of photons is called _____.
- 10 If $t_{\frac{1}{2}}$ of a radioisotope is 3.465×10^3 years, what will be its decay constant ?
- 11 For a third order reaction, concentration is expressed in moles litre $^{-1}$ and time in seconds. What will be the unit of its rate constant K ?

Turn over

12 For a chemical change $X \rightarrow Y$, it is found that the rate of the reaction is doubled when concentration of X is doubled. The order of the reaction is :

- (a) 1. (b) 2.
(c) 3. (d) 0.

(12 × ¼ = 3 weightage)

Section B

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

- 13 Calculate the wave number of an electromagnetic radiation of wavelength 4000 Å .
14 State Frank-Condon principle.
15 If the intercepts of a crystal plane are $\frac{a}{2}$, b and $\frac{c}{2}$, what are its Miller indices ?
16 Distinguish between rate and rate constant of a reaction.
17 State law of photochemical equivalence.
18 Define binding energy.
19 What is nuclear fission ?
20 Quantum yield of $H_2 - Cl_2$ reaction is abnormally high. Why ?
21 Write Bragg equation. Explain the terms.

(9 × 1 = 9 weightage)

Section C

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

- 22 Outline the principles of IR spectroscopy.
23 Give an account of powder method of crystal study.
24 What are liquid crystals ? Name the different types. Give one example for each.
25 Briefly explain the principles of Aston's mass spectrograph.
26 Explain intermediate compound formation theory.
27 Distinguish between order and molecularity.
28 Derive integrated rate equation for a first order reaction. Explain the terms.

(5 × 2 = 10 weightage)

Section D

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

29 (a) What do you mean by the following in NMR spectroscopy?

(i) Chemical shift.

(ii) TMS

Give the advantages of using TMS.

(b) The NMR spectrum of an isomer of C_4H_9Br consists of a single sharp line. Identify the isomer.

30 Give a brief account of different types of defects found in crystals.

31 (a) Discuss Collision theory of reaction rate.

(b) Write Arrhenius equation for reaction rate. Explain the terms.

(2 × 4 = 8 weightage)