Q.P. Code – 50723

Second Year B.Sc. Degree Examination

SEPTEMBER/OCTOBER 2013

(Directorate of Distance Education)

(DSB 260) Paper II – CHEMISTRY

Time : 3 Hours] $\hspace{4cm}$ *[Max. Marks : 75/85*

Instructions to Candidates :

1) *This paper consists of five Sections. Answer all Sections.*

2) *Section **A** contains **one** mark questions and should be answered in the first **two** pages of the main answer book. The questions of Section **A** answered in any other part of the answer book **will not** be valued.*

3) *Write equations and neat diagrams **wherever** necessary.*

4) *Section-**E** is **compulsory** for **85** marks scheme **only**.*

SECTION – A

Answer **ALL** the following in a word, a phrase or in a sentence :   **10 × 1 = 10**

1. What is the geometric shape of XeF_4 ?

2. Define lattice energy.

3. What are pseudohalogens?

4. Complete the following nuclear reaction $_{92}U^{238} \rightarrow \cdots + {_2}He^4$.

5. What is an isolated system?

6. Write the mathematical form of Phase rule.

7. Define Order of a reaction.

8. Write the resonance structure of Carboxylate ion.

9. Give the composition of Dynamite.

10. Why Grignard reagents are prepared and used in ether solutions?

SECTION – B

Answer any **FIVE** of the following :   **5 × 3 = 15**

11. What are the factors favouring ionic bond formation?

12. Explain the structure of BF_3 molecule and its Lewis Acid characteristics.

13. Discuss the stability of nucleus in terms of n/p ratio and binding energy.

14. Explain Ostwald's theory of indicators by taking phenolphthalein as an example.

15. Derive the relation $C_p - C_v = R$.

16. Explain the mechanism of Aldol condensation.

17. How is phenol manufactured from Cumene?

SECTION – C

Answer any **FIVE** of the following :   **5 × 6 = 30**

18. (a) Give any four differences between BMO (bonding molecular orbital) and ABMO (anti bonding molecular orbital).

    (b) Draw the molecular orbital diagram for oxygen molecule and calculate its bond order.   **2 + 4**

19. (a) Discuss the shape and structure of Ammonia and Water molecule using VSEPR theory.

    (b) Define the terms :

        (i) Accuracy

        (ii) Precision   **4 + 2**

20. (a) Derive an expression for the rate constant of a Second order reaction. When the initial concentrations of the reactants are not equal $[a \neq b]$.

    (b) Define the terms :

        (i) Degree of polymerisation

        (ii) Joule–Thomson effect   **4 + 2**

21. (a) Explain the phase diagram of water system.

    (b) 5 moles of an ideal gas at 25°C is allowed to expand reversibly and isothermally from a volume of 1 dm³ of 10 dm³. Calculate the work done by the gas. **4 + 2**

22. (a) How is glycerol manufactured from molasses?

    (b) What is the action of heat on β and γ hydroxy acids? Write the equations. **3 + 3**

23. (a) How do you distinguish between 1°, 2° and 3° alcohols by Victor Meyer's method?

    (b) "Dimethyl amine is stronger base than Methyl amine" Why? **4 + 2**

24. (a) How is Tetra ethyl lead prepared? Give any one use of it.

    (b) Give the mechanism of estarification reaction with suitable example. **2 + 4**

SECTION – D

Answer any **TWO** of the following : **2 × 10 = 20**

25. (a) What is hydrogen bonding? Explain the types with suitable example.

    (b) Calculate the degree of hydrolysis of ammonium acetate. The dissociation constant of ammonium hydroxide is 1.75×10^{-5} and that of acetic acid is 1.81×10^{-5} and K_w is 1.008×10^{-14}.

    (c) How amines are prepared from nitro compounds?

    (d) Define : (i) Inductive effect (ii) Resonance effect. **3 + 3 + 2 + 2**

26. (a) Discuss the structure and bonding in Diborane.

    (b) Derive Kirchoff's equations.

    (c) Explain Arndt-Eistert synthesis. **4 + 4 + 2**

27. (a) Write any three differences between VBT and MOT.

    (b) Give any two uses of Neon.

    (c) Explain the mechanism of Perkin's reaction.

    (d) State Ostwald's dilution law. **3 + 2 + 4 + 1**

3 **P.T.O.**

SECTION – E

Answer any **ONE** of the following questions :   **1 × 10 = 10**

(Compulsory question for **85** marks scheme **only)**

28. (a) (i) Explain Band theory of solids for conductors, semiconductors and insulators.

    (ii) What are Freezing mixtures? Give one example.   **3 + 2**

    (b) (i) How do you distinguish between 1°, 2° and 3° amines by Nitrous acid test?

    (ii) Write any four differences between Sigma and Pi bonds.   **3 + 2**

29. (a) (i) Derive Henderson's equation for the pH of acidic buffer.

    Define :

    (ii) Coordinate bond

    (iii) Radioactive equilibrium   **3 + 2**

    (b) (i) What are parallel and consecutive reactions? Give one example for each.

    (ii) Nitro phenols are more acidic than Phenol. Give reason.   **3 + 2**

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