Second Year B.Sc. Degree Examination
Aug/Sept 2009
Directorate of Correspondence Course
(Freshers)

PAPER - II : CHEMISTRY

Time : 3 Hours | Max. Marks : 85

Note : 1) This paper consists of four sections. Answer all sections.
2) Write equations & neat diagrams wherever necessary.

SECTION - A

I. Answer in a word, a phrase or a sentence. 10x1=10

1. Define activity coefficient.
2. What is degree of polymerisation?
3. Define order of a reaction.
4. What is meant by Lattice energy?
5. Mention uses of Argon.
6. What are Pseudohalogens?
7. Write the structural formula of phloroglucinol.
8. What is +I effect?
9. Write the IUPAC name of Glycerol.
10. Complete the following reaction

$C_6H_5NO_2 \xrightarrow{Sn/Hcl} ?$

SECTION - B

II. Answer any FIVE of the following. 5x3=15

11. How is the order of the reaction determined by differential method?
12. Deduce an expression for the hydrolysis constant & degree of hydrolysis for the salt of a strong acid & weak base.
13. Compare valence bond theory & molecular orbital theory (any 3).
14. Discuss the structure & bonding in Xenon terafluoride.
15. Explain why hydroxy group acts as an ortho-para director towards electrophilic aromatic substitution.
16. Arrange the following in the order of increasing basic strength & justify your answer
$C_6H_5NH_2$, $C_6H_5N(CH_3)_2$, $C_6H_5NHCH_3$

17. Calculate the activation energy of a reaction whose reaction rate at 27^0C gets doubled for 10^0C rise in temperature [R=8.314].

SECTION - C

III. Answer any FIVE of the following. **5x6=30**

18. a) Derive Kirchoff's equation showing the variation of heat of reaction with temperature. **4**

    b) Explain the following terms

    i) Isochoric process

    ii) Heat capacity at constant volume **2**

19. a) Complete the following nuclear reactions

    i) $^{27}_{13}Al + ^{1}_{0}n \longrightarrow ^{24}_{11}Na + ?$ ii) $^{14}_{7}N + ? \longrightarrow ^{11}_{6}C + ^{4}_{2}He$

    iii) $^{12}_{6}C + ^{2}_{1}H \longrightarrow ? + ^{4}_{2}He$ **3**

    b)Describe the viscosity method for determining the molecular weight of a polymer. **3**

20. a) Calculate lattice energy of NaCl crystal from the following data
    Sublimation energy of sodium = 108.7 KJ mol^{-1}
    Dissociation energy for chlorine = 225.9 KJ mol^{-1}
    Ionisation energy of sodium = 489.5 KJ mol^{-1}
    Electron affinity of chlorine = –351.4 KJ mol^{-1}
    Heat of formation of NaCl = 414.2 KJ mol^{-1} **3**

    b) Draw molecular orbital energy level diagram for oxygen molecule. **3**

21. a) What is SP^2 hybridisation? Explain the shape of BF_3 molecule based on this hybridisation. **4**

    b) Explain intermolecular hydrogen bonding with an example. **2**

22. a) How would you synthesize the following from ethyl magnesium iodide?
    i) Ethane ii) 2-Butanol iii) Propionic acid **3**

    b) Explain Victor Meyer's method for distinguishing primary, secondary & tertiary alcohols. **3**

23. a) What is the action of Glycerol on the following reagents
    i) Oxalic acid at 503K ii) $KHSO_4$ & heat iii) Sodium **3**

    b) How is Acetyl chloride converted into propionic acid? **3**

24. a) Write the IUPAC name of the following
    i) Succinic acid ii) Adipic acid **2**

    b) Mention the factors which favour the formation of ionic bond. **2**

    c) What are essential features of freezing mixture? **2**

SECTION - D

IV. Answer any THREE of the following. **3x10=30**

25. a) Draw the labelled phase diagram of sulphur system & discuss its salient features. 4

    b) Write any two nucleophilic addition reactions of aldehydes & ketones. 4

    c) Explain the terms

    i) Accuracy ii) Precision 2

26. a) Fluorine exists only in oxidation state of –1 whereas other halogens exhibit negative as well as positive oxidation state. Explain. 3

    b) Explain hyper conjugation effect with an example. 3

    c) What is inversion temperature? 1

    d) Ten moles of an ideal gas at the initial pressure of one atmosphere at 0^0c was expanded to final pressure of 0.1 atmosphere. Calculate the work done by the gas. 3

27. a) Explain why O-nitrophenol has a lower B.P & solubility in water than the para nitrophenol. 2

    b) Which of the following acids will be more acidic & why?

    Chloroacetic acid & aceticacid 2

    c) Discuss the stability of nucleus in terms of neutron-proton ratio. 3

    d) Mention the postulates of VSEPR theory & discuss the distorted geometry of water molecule. 3

28. a) Explain the properties of the following on the basis of band theory

    i) insulator ii) semiconductor iii) conductor 3

    b) Silicon dioxide is a solid but carbon dioxide is a gas. Explain. 2

    c) How do primary alcohols react with the following reagents?

    i) Acetic acid ii) Hydrogen iodide iii) Copper heated to 300^0c

    d) Predict the products of the followings reaction & write its structural formula.

    i) $2\ CH_3CH(OH)\ COOH \xrightarrow{\Delta} ?$

    ii) $HOCH_2CH_2CH_2COOH \xrightarrow{\Delta} ?$

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