

B.TECH. (AEROSPACE ENGINEERING)
(BTAE)

Term-End Examination

01989

December, 2012

BAS-002 : APPLIED CHEMISTRY

Time : 3 hours

Maximum Marks : 70

Note : Answer *seven* questions in *all*. Question number 1 is *compulsory*. Use of calculator is *allowed*.

1. Define *any five* of the following : 5x2=10

- (a) Second law of thermodynamics
- (b) Le Chatelier principle
- (c) Frenkel defect
- (d) Specific conductance and its unit in SI.
- (e) Raoult's law
- (f) Condensation polymerisation with an example
- (g) Electronic configuration of outermost shell for p-Block and d-block elements.

2. Answer *any two* of the following :

- (a) Compare the basic strength of the following 5
and arrange them in increasing strength :
 NH_3 CH_3NH_2 , $(\text{CH}_3)_2\text{NH}$, $(\text{CF}_3)_3\text{N}$

- (b) Draw and explain the nature of conductometric titration curve that you will get when AgNO_3 is added to KCl solution. 5
- (c) What do you understand by heterolytic and homolytic fission ? Explain with examples. 5
3. (a) A compound, has a molecule, superimposable on its mirror image inspite of containing chiral carbon atom. What type of compounds show such phenomena ? Explain with an example. 5
- (b) What are inner transition elements ? Write down electronic configuration of the element with atomic number 61. 5
4. (a) Why $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ is blue whereas $\text{ZnSO}_4 \cdot \text{H}_2\text{O}$ is colourless ? Explain 2
- (b) What transition in the H-spectrum would have the same wavelength as the Balmer transition, $n=4$ to $n=2$ of He^+ spectrum. 4
- (c) Which one of the following will act as a strong base ? Arrange the following in their increasing order of basicity. 4
- $(\text{CH}_3)_3\text{COH}$, CH_3OH , $\text{CH}_3\text{CH}_2\text{OH}$,
 $(\text{CH}_3)_2\text{CHOH}$

5. (a) In +ve electromeric effect, if an electrophile is added to the following compound then in which direction π electron transfer will take place - 4
- C_3 to C_2 or C_2 to C_3 ?
- $CH_3-CH=CH-CH_2-CH_3$
- (b) In the dehydration of the Compound, 3
- $CH_3-\underset{\substack{| \\ OH}}{CH}-CH_2-CH_3$, we get two
- products namely
- (i) $CH_3-CH=CH-CH_3$ and
- (ii) $CH_2=CH-CH_2-CH_3$
- Which one will be the major product according to Saytzeff rule ?
- (c) How many resonating structures will you get for the carbonium ion, $(CH_3)_3C^+$ due to hyperconjugation ? 3
6. (a) What do you understand by 3
- (i) Green vitriol
- (ii) White vitriol
- (iii) Rochell salt
- (b) Explain the effect of 2
- (i) pressure and
- (ii) continuous removal of HI at constant temperature on the position of equilibrium for the following reaction
- $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$

(c) What will be the effect on the equilibrium constant for the above reaction, 6(b) by use of a catalyst ? 2

(d) Match the column X with the column Y 3

X	Y
(i) NO_2	(A) Yellow
(ii) CHCl_3	(B) Colourless
(iii) Pb_3O_4	(C) Red
(iv) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$	(D) Brown
(v) PbI_2	(E) Blue
(vi) I_2	(F) Violet

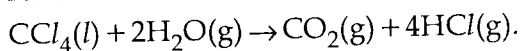
7. (a) HX is a weak acid ($K_a = 1.0 \times 10^{-5}$). It forms a salt NaX (0.1M) on reacting with caustic soda. Find the degree of hydrolysis. 4

(b) State Hund's rule. Explain it with reference to electronic configuration of nitrogen atom. 2

(c) An element, M has atomic number 29. Give the electronic configuration of M^+ and M^{2+} ions. 2

(d) What are the chief constituents of Portland cement ? 2

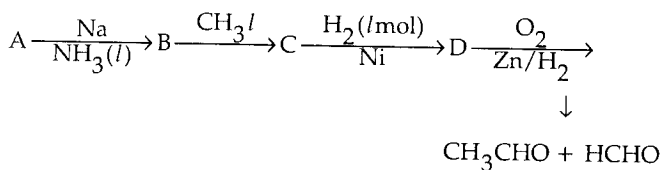
8. (a) The standard enthalpies of formation at 300 K for $\text{CCl}_4(l)$, $\text{H}_2\text{O}(g)$, $\text{CO}_2(g)$ and $\text{HCl}(g)$ are -107, -242, -394 and -93 kJ mol^{-1} respectively. Calculate the value of ΔE° at 300K for the reaction 5



- (b) Calculate the molar and equivalent conductivities at infinite dilution of potash alum $[K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O]$ Neglect the conductance offered by H_2O . 5

Given : Λ_m^∞ for $K^+ = 73.5 \Omega^{-1} cm^2 mol^{-1}$
 Λ_m^∞ for $Al^{3+} = 189.0 \Omega^{-1} cm^2 mol^{-1}$
 Λ_m^∞ for $SO_4^{2-} = 160.0 \Omega^{-1} cm^2 mol^{-1}$

9. (a) Identify the compounds A, B, C and D in the following transformations : 5



- (b) Give IUPAC names for the following : 2, 1, 2

