B.Tech. AEROSPACE ENGINEERING (BTAE)

Term-End Examination

December, 2017

BAS-002 : APPLIED CHEMISTRY

Time : 3 hours   *Maximum Marks : 70*

Note : Attempt any seven questions. All questions carry equal marks use of scientific calculator is permitted.

1. (a) Calculate the shortest frequency of   5
         radiations in the Paschen Series.

    (b) (i)   What are the drawbacks of Bohr's   5
               Models ?

         (ii) If the electron in a hydrogen atom goes
               from $n = 10$ state to ground state, a
               photon will be emitted. Calculate the
               wavelength of photon emitted.

2. (a) Write the electronic configuration of the   3
         following ions.
         $_8O^{2-}$, $_{29}Cu^{2+}$

    (b) Explain the following :   4
         (i)   Fluorine has lower electron affinity
               than chlorine.
         (ii) Why does ionisation energy decrease
               from Be to B ?

(c) Which has higher electron affinity and why ? **3**

(i) $_6C$ or $_9F$ (ii) $_9F$ or $_{53}I$

3. (a) (i) "All inert gases are mono atomic". Explain. **2**

(ii) Explain why $CuSO_4 \cdot 5H_2O$ is blue whereas $ZnSO_4 \cdot H_2O$ is colourless. **2**

(b) Write the names of the following complexes : **6**

(i) $[Cr(NH_3)_3(NO_2)_3]$

(ii) $[Cr(H_2O)_4Cl_2]Cl$

(iii) $[Co(NH_3)_5 \cdot H_2O]Cl_3$

4. (a) Describe in brief the manufacture of HNO_3 from NH_3 by Ostwald's Process. **4**

(b) Give reasons for the following :

(i) Sodium hydroxide flakes or pellets should not be exposed to air **3**

(ii) Brine is purified before being used in manufacture of soda ash **3**

5. (a) Define Eletrophiles and Nucleophiles. Give two examples of each. **5**

(b) (i) Explain what is meant by 'Coal tar' and 'Coke'. **5**

(ii) What is a Plasticizer ? What are its functions ?

6. (a) (i) Can you store copper sulphate 5
solution in a zinc pot ? Explain.

(ii) Draw a diagram of a Daniel cell and label it.

(b) Two half cells are : 5
$Al^{3+}(aq)/Al$ and $Mg^{2+}(aq)/mg$
The reduction potential of these half cells are -1.66 V and -2.36 V respectively. Calculate the cell potential and also write cell reaction.

7. (a) Arrange the following hydrocarbons in the 5
increasing order of their boiling points and explain.

(i) 2, 3-dimethylbutane

(ii) n-hexane

(iii) 2-methylpentane

(iv) 2, 2-dimethylbutane

(b) What do you mean by corrosion ? Explain 5
Electrical protection or Cathodic protection.

8. (a) Write the characteristics of Equilibrium 5
constant.

(b) The following concentrations were obtained 5
for the formation of NH_3 from N_2 and H_2 at equilibrium at 500 K,
$[N_2(g)] = 1.5 \times 10^{-2}$ M
$[H_2] = 3.0 \times 10^{-2}$ M
$[NH_3(g)] = 1.2 \times 10^{-2}$ M
Calculate equilibrium constant.

9. (a) What is the effect of temperature and 5
concentration on the state of equilibrium of
the following reaction ?

$$A + B \rightleftharpoons 2C + D + heat$$

(b) Calculate the degree of dissociation of 5
0.01M solution of formic acid
$(K_a = 2.1 \times 10^{-4}$ at 298 K).

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