00810

B.TECH. (AEROSPACE ENGINEERING) (BTAE)

Term-End Examination

June, 2013

BAS-002 : APPLIED CHEMISTRY

Time : 3 hours *Maximum Marks : 70*

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

1. (a) How are the chemical elements classified on the basis of their electronic configurations ? Enumerate the main characteristics of any one class of elements. 6

(b) What is ionization potential ? What are the factors on which it depends ? 4

2. (a) Write short notes on the following : 5

(i) Electron affinity

(ii) Electronegativity.

(b) What is the cause of hardness of water and how it can be removed ? What are the reasons for which we do not want to use it in industry or in our day to day work. 5

3. (a) (i) Justify the position of hydrogen in the periodic table on the basis of it's configuration. 5

(ii) What is the mass ratio of the isotopes of hydrogen ? Which isotope does not contain neutrons and which is radioactive ?

(iii) Why do we call hydrogen a 'green fuel' ?

(b) (i) Why boron and aluminium tend to form co-valent compounds ? 5

(ii) Why does carbon shows catenation but silicon does not ?

4. (a) Explain Le Chatelier's principle ? What does the equlibrium constant K<1 indicate ? 5

(b) For the reaction N_2 (g) + $3H_2(g) \rightleftarrows 2NH_3(g)$ at 400K, K_p=41 5

Find the value of K_p for each of the following reactions at same temp.

(i) $2NH_3(g) \rightleftarrows N_2(g)+3H_2(g)$

(ii) $\frac{1}{2} N_2(g) + \frac{3}{2} H_2(g) \rightleftarrows NH_3(g)$

(iii) $2N_2(g)+6H_2(g) \rightleftarrows 4NH_3(g)$

5. (a) What is the difference between Galvanic cell and Electrolytic cell ? Explain the function of salt bridge in an Electrochemical cell. 5

(b) What do you understand by Normal Hydrogen Electrode ? Give its construction and working. 5

6. (a) Define Kohlrausch's Law. How can it be used to find the degree of dissociation of a weak electrolyte ? 5

(b) Which type of metal can be used in cathodic protection of Iron against rusting and why ? 2

(c) What is fuel cell ? State two advantages of H_2-O_2 fuel cell over ordinary cell. 1+2=3

7. (a) The paramagnetic character in 3d transition series elements increases upto M_n and then decreases. Explain why ? 3

(b) Give the expression for K_p for the oxidation reaction (SO_2 to SO_3) in the process of H_2SO_4 production. 2

(c) What do you understand by the fixation of N_2 ? Describe two methods for the fixation of N_2 ? 5

8 (a) Explain the following terms : 2x3=6

(i) Quantum Number

(ii) Schrodinger Equation

(iii) Screening Constant

(b) Calculate the energies for n = 1 and n = 2 states of a particle of mass = 9.108×10^{-31} confined to a one - dimensional box of length 0.1 mm. 4

9. (a) Describe the reactions usually taking place during production of molten iron from it's ore, in a Blast Furnace 5

(b) Describe the following in brief : 5

(i) Ion exchange resins

(ii) Solvent extraction