B.TECH. (AEROSPACE ENGINEERING) (BTAE)

Term-End Examination

December, 2011 00482

BAS-002 : APPLIED CHEMISTRY

Time : 3 hours *Maximum Marks : 70*

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

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

(a) Inner transition elements

(b) Orbital

(c) Dipole moment

(d) Chiral centre

(e) Standard Reduction potential

(f) Electromagnetic spectrum

(g) Zielger and Natta polymerisation

2. Answer ***any two*** of the following : **2x5=10**

(a) What is Mulliken's Scale for the electro negativity of atom of an element ? Give the relation to define the electronegativity of atom A as given by Mulliken.

(b) Define metallic character of an element. How it is linked with ionization potential of the element ?

(c) Define standard electrode potential of metal. Write three uses of standard oxidation potential values.

3. Write about Bohr's model of atom with respect to the following : **10**

(a) Bohr's postulation about the electrons and energy levels and their absorption and emission.

(b) Radius of the Bohr's orbit with the help of a suitable sketch.

(c) Calculate Bohr's radius (a_o) of the first H orbit.

4. (a) Some nitrogen and hydrogen gases are pumped into an empty 5 - litre glass bulb at 500°C temperature. When an equilibrium is established, 3.0 moles of N_2, 2.10 moles of H_2 and 0.298 moles of NH_3 are found. Find the value of K_C for the reaction. **2x5=10**

(b) Define chemical equilibrium. Explain with the help of a diagram the forward and back reaction along with the equilibrium as a function of time and rate.

5. Give reasons for *any five* of the following : **5x2=10**

(a) In normal elements, size of atoms and ions decreases from left to right across a period.

(b) Shielding (Screening) effect lowers the ionization potential in multi electron atoms.

(c) There is contraction of water on warming from 0°C to 4°C.

(d) The size of cations of the same element in different oxidation states decreases with increase in oxidation state.

(e) H atom covalently bonded to atom A (A-H) can not form second covalent bond with another atom.

(f) The metallic character increases as we move down from top to bottom in the given group of periodic table.

6. (a) Name the following compounds : 5

(i) $[Fe\ (H_2O)_6]\ SO_4$

(ii) $Na_3\ [CO\ (NO_2)_6]$

(iii) $[CO\ (NH_3)_6]\ Cl_3$

(iv) $[Cr\ (en)_3]\ Cl_3$

(v) $[Ag\ (NH_3)_2]\ Cl$

(b) State which of the following are excited and which ones are unexcited configurations : 5

(i) $1s^2, 2s^2$

(ii) $1s^2, 2s, 2p^2$

(iii) $1s^2, 2s^2, 2p^2$

(iv) $1s^2, 2s, 2p^3$

(v) $1s^2, 2s, 2p$

7. (a) Find the energy of difference between $n=4$ and $n=3$ levels of hydrogen and calculate the frequency of radiation emitted when an electron transits between these levels (Planck's constant $= 6.626 \times 10^{-34}$ Js^{-1}) 5

(b) Among the following sets of quantum numbers, state which are possible. Explain why the others are not permitted. 5

(i) $n=1, l=0, m=-1, s=+\frac{1}{2}$

(ii) $n=1, l=0, m=0, s=-\frac{1}{2}$

(iii) $n=2, l=3, m=0, s=+\frac{1}{2}$

(iv) $n=3, l=1, m=1, s=-\frac{1}{2}$

(v) $n=0, l=0, m=0, s=+\frac{1}{2}$

8. (a) Write the types of structural isomerism. Give the functional isomers of C_2H_6O along with their names. 5

(b) Define polymerisation. Classify Polymers on the basis of their origin. Write name and formula of polythene and teflon polymers. 5

9. (a) Define oxidation number (state). Calculate the oxidation number of the following : 5

(i) H_2SO_4

(ii) $KMnO_4$

(iii) $K_2Cr_2O_7$

(iv) $\underline{N}H_4^+$ (underlined element only)

(v) $\underline{P}O_4^{3-}$ (underlined element only)

(b) Give the Ostwald's process for the manufacture of nitric acid. Discuss how temperature and pressure affect (favour) the output of this acid ? 5