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BAS-002

B. TECH. IN AEROSPACE ENGINEERING (BTAE)

Term-End Examination

June, 2019

BAS-002 : APPLIED CHEMISTRY

Time : 3 Hours *Maximum Marks : 70*

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

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1. Explain the following giving reasons : 2 each

   (a) Usually the first ionization energy of elements increases with the atomic number of elements in a period of the periodic table.

   (b) Fluorine has lower electron affinity than chlorine.

(c) Ionization energy decrease from Be to B and Mg to Al.

(d) Diamond is an insulator while graphite conducts electricity.

(e) All gases are mono-atomic.

2. (a) What do you understand by isomers ? Write the structures and IUPAC names of the isomers of C_5H_{10}. 5

(b) What is the difference between a Galvanic cell and a Concentration cell ? 5

3. (a) Explain in brief any *three* of the following terms with illustrations : 6

(i) Structural isomerism

(ii) Stereoisomerism

(iii) Position isomerism

(iv) Tautomerism

(b) Write down the equations for the manufacture of HNO_3 from NH_3 by Ostwald's process. 4

4. (a) Explain how methane is used in the synthesis of ammonia and methanol. 6

   (b) (i) What is meant by cross linking of the chains ? 2

   (ii) Why are silicon polymers important macromolecules ? 2

5. (a) Choose the correct alternatives from the elves given at the end of each statement : 5

   (i) The size of the atom in Thompson's model is ..... the atomic size in Rutherford's model.

   (much greater than; no different from; much less than)

   (ii) In the ground state of ..... electrons are in stable equilibrium, while in ..... electrons always experience a net force.

   (Thompson's model, Rutherford's model)

(iii) A classical atom based on ..... is doomed to collapse.

(Thompson's model, Rutherford's model)

(iv) An atom has a nearly continuous mass distribution in ..... but has a highly non-uniform mass distribution in ..... .

(Thompson's model, Rutherford's model)

(v) The positively charged part of the atom possesses most of the mass of the atom in ..... .

(Rutherford's model; both the models)

(b) The ground state energy of hydrogen atom is – 13.6 eV. What are the kinetic energy and potential energy of the electron in this state ? 5

6. (a) Write the electronic configuration of the following elements (any *five*) : 5

(i) Al (13)

(ii) Cl (17)

(iii) Fe (26)

(iv) Ba (56)

(v) Pt (78)

(vi) Hg (80)

(b) What are fuel cells ? How are these better than the conventional electrochemical cells ? 5

7. The reaction for the preparation of ammonia by Haber's process is given as : 5, 5

$$N_2 (g) + 3 H_2 (g) \rightleftharpoons 2 NH_3 (g)$$

(i) Write the expressions for K_p and K_c for the above equilibrium reaction.

(ii) Establish a relationship between K_p and K_c for the same.

8. (a) Differentiate between primary cells and secondary cells. 5

(b) Define the following : 5

(i) Solvent extraction

(ii) Condensation polymers

(iii) Multiple bonding

(iv) Galvanic corrosion

(v) Chiral centre

9. (a) What are the various sources available for the production of SO_2 ? Give equations for each of these. 5

(b) A photon of wavelength 3310 Å falls on a photocathode and an electron of energy 3×10^{-19} J is ejected. If the wavelength of the incident photon is changed to 5000 Å,

the energy of the ejected electron is 7.91×10^{-20} J. Calculate the value of Planck's constant and threshold wavelength of the photon. 5