Final Assessment Test – Jan / Feb 2023

VIT
Vellore Institute of Technology

Course: BCHY101L - Engineering Chemistry
Class NBR(s): 5227 / 5232 / 5234 / 5236 / 5238 / 5243 / 5245 / 7319
Slot: B1+TB1
Time: Three Hours
Max. Marks: 100

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION, IS TREATED AS EXAM MALPRACTICE

Answer any TEN Questions

(10 X 10 = 100 Marks)

1. What is the physical significance of PV-diagram in thermodynamics? Draw the PV-diagram for the reversible isothermal expansion and isochoric process and derive the expression for the work done in the context of first law of thermodynamics.
2. Draw the structures of (i) $Ni(\eta^5\text{-Cp})_2$ (ii) $Co(\eta^3\text{-allyl})_2$ (iii) $Fe(\eta^5\text{-}C_5H_5)_2$ and (IV) $Fe(\eta^4\text{-}C_4H_4)(CO)_3$. Apply 18VE rule and discuss their stability.
3. Explain the criteria for any compound to be (i) Aromatic (ii) Anti-aromatic and (iii) Non-aromatic with appropriate examples. Explain in detail the aromaticity of pyrrole and protonated pyrrole.
4. Discuss about the n-type and p-type semiconductors with proper diagrams? Explain a method in detail with a proper diagram to obtain single crystalline semiconductors.
5. Explain in detail why conducting polymers are in need of present world. Discuss the conductivity mechanism in polyacetylene.
6. Explain using Beer-Lambert law, how concentration of an analyte is obtained. Discuss the electronic excitations in UV- Visible spectroscopy using energy level diagram.
7. Purification of water is very challenging now-a-days due to the presence of various chemical impurities. Explain the ion-exchange process of demineralization of water by depicting chemical equations.
8. Discuss the difference between thermoplastic and thermosetting polymers. Explain the properties and uses of a thermosetting plastic with a chemical structure.
9. A galvanised iron pipe used in water line is getting corroded at the junction where the pipe is coming out from the ground. Explain the phenomenon of corrosion using a neat diagram.
10. a) One mole of an ideal gas is heated from 100 K to 300 K. Calculate ΔS if (i) the volume is kept constant and (ii) the pressure is kept constant. Assume that $C_V = 1.5$ R.
    b) Why do plant leaves appear green? Explain the working mechanism involved in photosynthesis.
11. a) Discuss the importance of dyes in fabric industry. Explain the chemical mechanism involved in the synthesis of a dye, which is having origin of the plant called "*Indigofera* genus". [5]
    b) Describe the construction and working of the rocking chair battery used in the aircraft auxiliary units. Explain its discharging and charging mechanisms with a neat sketch. [5]
12. a) 0.84 gram of a fuel containing 80% carbon, when burnt in a bomb calorimeter, increased the temperature of water from 27.3° to 29.1°C. If the calorimeter contains 250 grams of water and its water equivalents are 150 grams, calculate the HCV of the fuel. [5]
    b) Discuss any five factors that influence the corrosion. [5]

⇔⇔⇔