(b) Draw the isotherms of CO_2 according to Van der Waals equation and account of that in comparison to Andrews experiment. 4

Or

10. (a) Define surface tension and viscosity. 2+2=4

(b) Define Miller indices with suitable example. 2

(c) Under what condition Langmuir adsorption isotherm reduces to Freundlich adsorption isotherm. 4

UG Odd Semester Examination, 2022

EDUCATION B.Sc. B.Ed

(3rd Semester)

Course No.: BSCP-303

(General Chemistry)

Full Marks: 50

Pass Marks: 20

Time: 2 hours

The figures in the right margin indicate full marks for the question.
Answer the following five (5) questions

1. (a) Write down the postulates of Bohr's theory. 3

(b) Find out the Kinetic energy of an electron moving in the second Bohr orbit. 5

(b) Write down Heisenberg's uncertainity principal. 2

Or

2. (a) Via the determination of Zeff using Slater's rule, explain why the valance configuration of the ground state of a V^+ ion is likely to be $3d^3 4S^1$ rather than $3d^2 4S^2$. 5

(b) Write down Schrodinger wave equation (mentioning all the terms) for hydrogen atom. 2

(c) Write a detailed note on Bauling scale of electromagnativity. 3

3. (a) Using ion-electron method balance the reduction of dichromate ion ($Cr_2O_7^{2-}$) to Cr^{3+}(ag) by Fe^{2+}(ag), in acid medium. 4

(b) Write down two examples of acid-base reactions in liquid ammonia. 2

(c) Deduce the Narnst equation for only electrode reaction (oxidation reduction reaction according to the international convention). 4

Or

4. (a) Arrange the following with detailed justification according to the increasing Lewis base character : 2

NH_3, NHR_2, NH_2R

(b) Write a brief note on Arrhenius concept of Acids and Bases, including its usefulness and limitations. 5

(c) With suitable example define hard acids and hard bases. 2

(d) Give one example each from borderline acid and base. 1

5. (a) Give orbital representation of acetylene molecule. 2

(b) Write a brief note on 'tautomerism' or 'hyperconjugation'. 3

(c) Cyclopentadienyl anion is aromatic. Justify. 4

(d) Define bond length. 1

Or

6. (a) Write down the mechanism of any one : 5

(i) Wittig reaction

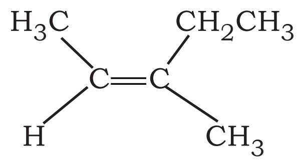
(ii) Mannich reaction

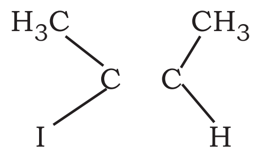
(b) Give plausible mechanism for any one of the following rearrangements : 5

(i) Hofmann

(ii) benzil-Benzilic acid

7. (a) Assign Cis-/trans and E/Z designations to each of the following compounds : 2+2=4

(i) 

(ii) 

(b) Arrange the following substituents in order of increasing priority : 2

$—CH=CH_2$, $—H$, $—D$, $—CH(CH_3)_2$, $—(CH_3)$

(c) Drawing the structures of the following molecules, show their symmetry elements :

(i) NH_3 (ii) BH_3 1½+1½=3

(d) Give example of a molecule, which contains S_4 symmetry element. 1

Or

8. (a) Give theoretical justification of the Markovnikov's rule considering the reaction between HX (here X is Cl or Br) and Z-methylpropene. 6

(b) "S_N2 reactions always lead to inversion of configuration"— justify with a suitable example. 4

9. (a) Derive the Van der Waals equation of state for real gasses. 6