Calculate the total number of collision that occur in a sample of the gas of 1.00 bar and 25^0C. 5

Or

10. (a) What is Tyndall effect? 2

(b) Write down the applications of colloids. 4

(c) What are the effect of concentration of electrolyte and temperature on criticla micelle concentration (CMC) in aqueous solution. 4

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UG Odd Semester Examination, 2022

EDUCATION B.Sc. B.Ed
(7th Semester)

Course No.: BSCH-702
(Physical 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 a detailed note on criteria of spontaneity and equilibrium of a process. 5

(b) Write down Clausius and Planck Kelvin statement of second law of thermodynamics. 2+2=4

(c) What is Trouton's rule? 1

Or

2. (a) What is molecular partition function? 2

(b) Show that the equilibrium distribution of particles following Boltzmann statistics is given by-

$$Ni = \frac{Ng_i \exp(-\beta \varepsilon i)}{\sum_i g_i \exp(-\beta \varepsilon i)}$$

Here, $\beta = {}^1/_{kT}$, and the other terms carry their usual meaning. 6

Turn Over

(c) Write down the third law of thermodynamics. 2

3. (a) Write down the variation theorem. 2

(b) Draw the molecular orbital diagrams of CO and justify the following fact : The negative end of the dipole (in CO molecute) is on the carbon atom despite being the less electronegative atom. 5

(c) Write down the postulates of molecular orbital theory. 3

Or

4. (a) Write down the molecular electronic configuration of any two among the following:

(i) O_2 (ii) N_2^+ (iii) O_2^+ 2+2=4

(b) Judge whether N_2^+ is likely to have a larger or smaller dissociation energy than N_2. 3

(c) What is overlap density? 2

(d) Define secular determinant. 1

5. (a) Define ionic mobility and mention its unit. 2

(b) Write down the Kohlrausch law of independent migration of ions. Using this law show that λ_0 of weak electrolyte (such as CH_3COOH) can be calculated. 3

(c) How does the equivalent conductance of strong electrolyte vary with dilution? Justify your answer. 5

Or

6. (a) Why the equivalent conductance of H^+ and OH^- are abnormally high? 3

(b) In a very old book, it is written that the equivalent conductance of a 0.01N solution of $CaCl_2$ is 120.36 $mho.cm^2/gm$ equivalent. Convert this value to the molar conductance in units of $S.m^2.mol^{-1}$. 2

(c) How transport number varies with temperature? 1

(d) Derive the Henderson equation for acid/ basic buffer solution. 4

7. (a) Define intersystem crossing. 2

(b) Write a detailed note on non-radiative processes. 3

(c) For the following photochemical reaction :

$$A+B \xrightarrow{h\upsilon} C+D$$

it is noted that irradiation of photon of 253.7 mm for 837 minutes causes the obsorption of 34.36 Joules of energy and 22.96×10^{-6} mol of D is formed. Find out the quantum yield of the reaction. 5

Or

8. (a) Distinguish between primary photochemical reaction and a secondary photochemical reaction. 3

(b) What is photochemical equivalence? 2

(c) Write a detailed note on Flurorescence. 5

9. (a) Deduce Stoke-Einstein equation. 4

(b) What is diffusion? 1

(c) It is given that one unknown gas molecule / atom is having collision diameter 0.218 nm.