



Physical Chemistry I

CHM 505

Time: 30min

Total Marks: (20)

Credit Hours 4(3-1)

Q. No 01. Choose the correct option

- The temperature at which the second coefficient of Virial equation become zero is known as
 - Critical temperature
 - Boyle's temperature
 - Eutectic point
 - Boiling point
- Average distance of gas molecules between two successive collisions
 - Mean path
 - path length
 - free path
 - mean free path
- V_{rms} for O_2 is -----times slower than that of H_2
 - 4 times
 - 8 times
 - 16 times
 - 32 times
- At high temperatures the number of molecules possessing most probable velocities
 - Increase
 - decrease
 - not affected
 - none of above
- Based on the first law of thermodynamics, which one of the following is correct?
 - For an isothermal process, $q = +w$
 - For an isochoric process, $q = -\Delta E$
 - For an adiabatic process, $w = -\Delta E$
 - For a cyclic process, $q = -w$
- One mole of which of the following has the highest entropy?
 - liquid Nitrogen
 - Hydrogen gas
 - Mercury
 - Diamond
- An engine operating between 100 and 0°C, takes 453.6kcal of heat, useful work done is
 - 453kJ
 - 463kJ
 - 509kJ
 - 408kJ
- Which of the following is not an intensive property
 - Temperature
 - surface tension
 - viscosity
 - entropy
- For a spontaneous process
 - $\Delta G = 0$
 - $\Delta G = -ve$
 - $\Delta G = +ve$
 - $\Delta S = 0$
- An isolated system comprises the liquid in equilibrium with vapor phase, Molar entropy of vapor is
 - More than that of liquid
 - Less than that of liquid
 - Equal to that of liquid
 - zero
- The enthalpy of fusion of water is 1.435 kcal/mol. The molar entropy change for the melting of ice at 0°C is
 - 5.26 cal/molK
 - 0.526 cal/molK
 - 10.52 cal/molK
 - 21.04 cal/molK
- In a reversible isothermal process, the change in internal energy is
 - 0
 - +ve
 - ve
 - None
- At high pressure Vander Waal's equation reduces to
 - $PV = RT$
 - $PV = RT - a/V^2$
 - $PV = RT + Pb$
 - $PV = RT - a/V$
- The rate of a chemical reaction doubles for every 10°C rise of temperature. If the temperature is raised by 50°C, the rate of the reaction increases by about
 - 10 times
 - 24 times
 - 32times
 - 64 times
- The rate equation for a reaction: $A \rightarrow B$ is $r = K [A]^a$. If the initial concentration of the reactant is a mol dm^{-3} , the half life period of the reaction is
 - k/a
 - a/k
 - $2a/k$
 - $a/2k$
- Half life period of a first order reaction is 1386 seconds. The specific rate constant of the reaction is
 - 0.05 sec^{-1}
 - 0.005 sec^{-1}
 - 0.0005 sec^{-1}
 - 0.00005 sec^{-1}
- SN_2 reactions are example of
 - elementary reactions
 - consecutive reactions
 - parallel reactions
 - complex reactions
- Which of the following would be correct units for the rate constant of a reaction that is second order overall?
 - s^{-1}
 - $\text{mol}^2 \text{ dm}^3 \text{ s}^{-1}$
 - $\text{mol cm}^{-3} \text{ s}^{-1}$
 - $\text{mol}^{-2} \text{ dm}^3 \text{ s}^{-1}$
- The entropy change of a reaction does not depend on
 - the state of reactants and products
 - nature of reactants and products
 - different intermediate reactions
 - initial and final enthalpy change of a reaction.
- Acid catalyzed hydrolysis of cane sugar is an example of
 - zero order reaction
 - pseudo 1st order reaction
 - 1st order reaction
 - 2nd order reaction

Roll No: _____



CHM 505

Time: 2 hr 30min

Total Marks: (80)

Credit Hours 4(3-1)

Physical Chemistry I

- Define the Maxwell's law of molecular velocities. How can we derive and relate different types of molecular velocities in gaseous systems. Also describe the effect of temperature and Molecular wt. on the velocities. (20)
- Define Free energy and its types, derive a relationship for free energy with equilibrium constant. Also describe the significance of this relation (20)
- What is the difference between unimolecular and bimolecular reactions. Elaborate with suitable examples. Derive a relationship for Lindmanns theory for unimolecular reactions? Also explain the effect of initial concentration on the order of unimolecular reactions (20)
- How does Virial equation helps to justify the deviation of gases from ideal behavior, which cannot be explained by Vander walls equation (10)
- Define partial molar quantities with suitable examples. What is chemical potential, describe its significance? (10)

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