P. P. SAVANI UNIVERSITY

First Semester of B.Sc. Examination

Feb.-2022

SSCH1020–PHYSICAL CHEMISTRY-I

12.02.2022, Saturday **Time: 12:00 p.m. to 02:30 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

Section-I (Total Marks - 30)

Q.1 Short Questions [10]

1.1 Objectives [05]

1.1a At what pH equivalence point of weak acid ~ strong base?

A 10-8
B 6-7
C 4-3
D 2-1

1.1b Which one is strong acid?

A CH_3COOH
B NaOH
C NH_3
D HCl

1.1c Name the conjugate base which is formed during HCl and H_2O reaction?

A Cl^-
B OH^-
C H_3O^+
D H^+

1.1d What is Titrant?

A Known solution
B Unknown solution
C Indicator
D Acid

1.1e What is Molarity?

A Mass/Volume
B Mass/Pressure
C Mass/Mass
D All are correct

1.1f The instruments used for determining refractive index are known as?

A Refractometers
B Manometer
C pHmeter
D Thermometer

1.1g Molar refraction RM is an?

A Additive and constitutive property
B Only constitutive property
C Only additive property
D All are correct

1.1h What is hydrogen bond?

A The attractive force which binds hydrogen atom with electronegative atom of a molecule
B The attractive force which binds oxygen atom with electronegative atom of a molecule
C The attractive force which binds nitrogen atom with electronegative atom of a molecule
D The attractive force which binds Sulphur atom with electronegative atom of a molecule

1.1i Induced- dipole attractions are called?

A London forces
B Von der Waal's forces
C Hydrogen bonds
D Ionic bonds

1.1j Heavier the molecule of a given liquid?

A Lower is viscosity
B Higher is viscosity
C Viscosity is not affected
D All are correct

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) [05]

1.2a If it is endothermic the solubility should _____?

1.2b Solids and liquids are highly incompressible and practically remain unaffected by changes in pressure (T/F)?

1.2c KH is the _____?

1.2d The increase of pressure, _____ the viscosity?

1.2e Define the term refractive index?

Q.2 Short Notes (Attempt any two) [06]

A Calculate the mole fraction of ethylene glycol ($C_2H_6O_2$) in a solution containing 20% of $C2H_6O_2$ by mass?

B Discuss the titration of weak acid ~ weak base?

C Calculate the Refractive index of benzene?

Q.3 Explain in detail (Attempt any two) [14]

A Discuss about (i) London force (ii) Hydrogen bonding?

B Discuss the Henry's law with Diagram?

C Discuss the titration of (i) strong acid ~ weak base (ii) strong acid ~ weak base?

Section-II (Total Marks - 30)

Q.1 Short Questions [10]

1.1 Objectives [05]

1.1a Particle size of molecular dispersion_____?

A Within micrometer
B Within nanometer
C Within centimeter
D Within meter

1.1b Natural colloid is?

A Fogs
B Moist
C Smoke
D All of the above

1.1c Which one is an example of associative colloids?

A soaps
B lipids
C milk
D Paint

1.1d If the concentration of lyophobic increases, then viscosity_?

A Increase
B Decrease
C Not greatly increases
D None are correct

1.1e What is Zeta potential?

A Potential in colloidal solution
B Volume in colloidal solution
C Pressure in colloidal solution
D Temperature in colloidal solution

1.1f What is limitations of Arrhenius Concept?

A Free H^+ and OH^- ions do not exist in water
B Limited to water only
C Some bases do not contain OH–
D All are correct

1.1g A weak acid has a strong conjugate base?

A Weak
B Strong
C Moderate
D All are correct

1.1h HSO_4^- and NH_4^+, which one has K_a higher?

A HSO_4^-
B NH_4^+
C Both are equal
D None are correct

1.1i What is the pH of bleach?

A 12.5
B 4.0
C 7.5
D 2.0

1.1j $[H+].[OH-] = ?$

A 1.0×10^{-14}
B 5.0×10^{-27}
C 1.0×10^{-15}
D 6.0×10^{-24}

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) [05]

1.2a Define the Arrhenius concept of acid and base?
1.2b Particle size of colloidal dispersion_____?
1.2c How many types of dispersions are there?
1.2d What is Bronsted- lowry acid?
1.2e What is mono protic acids?

Q.2 Short Notes (Attempt any two) [06]

A Write the disadvantages of colloidal preparation?
B The dissociation constants of formic acid and acetic acid are 21.4×10^{-5} and 1.81×10^{-5} respectively. Find the relative strengths of the acids?
C What is pH of the solution? Derive the relation between pH and pOH?

Q.3 Explain in detail (Attempt any two) [14]

A (i) What is Gold Number? (ii) State difference between lyophilic and lyophobic colloids?
B What is Association colloids? Discuss the pharmaceutical applications of colloids?
C (i) If a solution has a pH of 5.50 at 25°C, calculate its $[OH^-]$? (ii) The hydrogen ion concentration of a fruit juice is 3.3 × 10– 2 M. What is the pH of the juice? Is it acidic or basic?