Shiksha Classes Bhandara

Subject : Chemistry   **Topic : Ionic Equilibrium**   **M.M. : 100**

Marking Scheme:

(i) Each question is allotted 4 (four) marks for each correct response.

(ii) ¼ (one fourth) marks will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.

Q.1 A weak acid, HA is found to be 10% ionized in 0.01M aqueous solution. Calculate the pH of a solution which is 0.1 M in HA and 0.05 M in NaA.
(A) 5.365   (B) 6.355
(C) 3.653   (D) 6.59

Q.2 The pH of 0.1 M solution of the following salts increases in the order of :
(A) $NaCl < NH_4Cl < NaCN < HCl$
(B) $HCl < NH_4Cl < NaCl < NaCN$
(C) $NaCN < NH_4Cl < NaCl < HCl$
(D) $HCl < NaCl < NaCN < NH_4Cl$

Q.3 Stomach acid is a solution of HCl with concentration of 1.2×10^{-3} M. What is the pH of stomach acid-
(A) 3.92   (B) 2.92
(C) 4.92   (D) 1.92

Q.4 What must be the minimum concentration of NH_3 (aq) required to prevent AgCl from precipitation from one litre of solution containing 0.10 mol of $AgNO_3$ and 0.010 mol of NaCl. Given that
K_{sp} of AgCl = 1.8×10^{-10} and
K_f for $[Ag(NH_3)_2]^+$ = 1.6×10^7.
(A) 0.789 M   (B) 0.589 M
(C) 0.389 M   (D) 0.989 M

Q.5 How many grams of CaC_2O_4 will dissolved in distilled water to make one litre of saturated solution (K_{sp} = 2.5×10^{-9} and its molecular mass is 128.)
(A) 0.0064 g   (B) 0.0128 g
(C) 0.0032 g   (D) 0.0640 g

Q.6 The pK_a of formic acid is 3.75. The pH of a solution containing 0.02 M formic acid and 0.01 M sodium formate is-
(A) 3.80   (B) 5.00
(C) 3.45   (D) 4.25

Q.7 The solubility product values of barium sulphate and barium carbonate are 1.0×10^{-10} and 5.0×10^{-9} respectively When the two salts are equilibrated in pure water the ratio of $[SO_4^{2-}] / [CO_3^{2-}]$ is
(A) 0.02   (B) 0.10
(C) 0.05   (D) 0.12

Q.8 The self ionization constant for pure formic acid, K = $[HCOOH_2^+][HCOO^-]$ has been estimated as 10^{-6} at room temperature. What percentage of formic acid molecules in pure formic acid are converted to formate ion? The density of formic acid is 1.22g/cm³.
(A) 0.004%   (B) 0.04%
(C) 0.4%   (D) 0.02%

Q.9 A solution of HCl is diluted so that its pH changes by 0.3. How does concentration of H^+ ion change?
(A) 0.5 times of initial value
(B) 0.3 times of initial value
(C) 10^{-3} times increases
(D) None of these

Q.10 The pH of a 0.01 M solution of acetic acid is
(A) 2   (B) Less than 2
(C) Greater than 2   (D) Cannot be predicted

Q.11 HX is weak acid (K_a = 10^{-5}). It forms a salt NaX (0.1M) on reacting with caustic soda. The degree of hydrolysis of NaX is –
(A) 0.01%   (B) 0.0001%
(C) 0.1%   (D) 0.5%

Q.12 Which of the following is the strongest conjugate base ?
(A) Cl^- (B) CH_3COO^-
(C) SO_4^{2-} (D) NO_2^-

Q.13 A few drops of phenolphthalein indicator are added to 0.1 M solution of sodium butyrate at 25ºC. Calculate the fraction of phenolphthalein present as the coloured form within solution (pK_a of butyric acid = 4.824; K_{ln} = 3.16×10^{-10})
(A) 0.1518   (B) 0.3518
(C) 0.2518   (D) 0.6518

Q.14 How many gram of CaC_2O_4 will dissolve in one litre of saturated solution? K_{sp} of CaC_2O_4 is 2.5×10^{-9} mol⁻² and its molecular weight is 128.
(A) 0.0064g   (B) 0.0128g
(C) 0.0032g   (D) 0.0640g.

Q.15 Strength of an acid can be explained on the basis of
(A) Its concentration in solution
(B) Its degree of ionisation
(C) (A) and (B) both required
(D) It is an inherent property of acid.

Q.16 When a 0.1 N solution of an acid at 25ºC has a degree of ionisation of 8%, the concentration of OH^- present is :
(A) 1.25×10^{-3} (B) 1.25×10^{-11}
(C) 1.25×10^{-12} (D) 1.25×10^{-13}

Q.17 Calculate the molar concentration of a solution of acetic acid (HOAc) that has a pH of 3.00 (K_a = 1.8×10^{-5}) :
(A) 1.0×10^{-3} (B) 1.0×10^{-6}
(C) 0.057   (D) 0.010

Q.18 Sulphanilic acid is a/an
(A) Arrhenius acid   (B) Lewis base
(C) Neither (A) or (B)   (D) Both (A) and (B)

Q.19 To a 50 ml of 0.1 M HCl solution, 10 ml of 0.1 M NaOH is added and the resulting solution is diluted to 100 ml. What is change in pH of the HCl solution?
(A) 4.398   (B) 0.398
(C) 0.1   (D) None

Q.20 Calculate the pH of solution obtained by mixing 10 mL of 0.1 M HCl and 40 ml of 0.2 M H_2SO_4.

(A) 0.4685   (B) 0.2685

(C) 0.3615   (D) 0.7685

For Q.21-Q.25 :

The answer to each question is a NUMERICAL VALUE.

Q.21 A sample of 100 ml of 0.10 M acid HA ($K_a = 1 \times 10^{-5}$) is titrated with standard 0.10 M KOH. How many ml of KOH will have to be added when the pH in the titration flask will be 5.00 ?

Q.22 The basicity of phosphorous acid is-

Q.23 The pH at which $Mg(OH)_2$ begins to precipitate from a solution containing 0.10M Mg^{2+} ions [K_p of Mg $(OH)_2 = 1 \times 10^{-11}$] is

Q.24 A 0.1 M solution of weak acid HA is 1% dissociated at 25°C. If this solution is with respect to NaA 0.2 M, The new degree of dissociation of HA is ($X \times 10^{-5}$). Find the value of X.

Q.25 pH of a saturated solution of $Ba(OH)_2$ is 12. Its solubility product is 5×10^{-X}. Find the value of X.