1. One litre of water contains 10^{-7} moles of H^+ ions. Degree of ionisation of H_2O is
   (a) 1.8×10^{-7} (b) 0.8×10^{-9}
   (c) 3.6×10^{-7} (d) 3.6×10^{-9}
2. The dissociation constant of weak acid is 1.0×10^{-5}. The equilibrium constant for the reaction with strong base is
   (a) 1.0×10^{-5} (b) 1.0×10^{-9}
   (c) 1.0×10^{7} (d) 1.0×10^{14}
3. 0.2 M solution of formic acid is ionised 3.2%. Its ionisation constant is
   (a) 9.6×10^{-3} (b) 2.1×10^{-4}
   (c) 1.25×10^{-6} (d) 4.8×10^{-5}
4. At 90° C, pure water has $[H_3O^+] = 10^{-6}$ mol L^{-1}. The value of Kw at 90° C is
   (a) 10^{-6} (b) 10^{-8}
   (c) 10^{-12} (d) 10^{-14}
5. Which of the following has the highest pH?
   (a) distilled water (b) 1M NH_3
   (c) 1M NaOH
   (d) H_2O saturated with Cl
6. The pH of 0.1 M acetic acid is (α = 100 %)
   (a) less than one (b) greater than one
   (c) one (d) seven
7. An acid solution of pH = 6 is diluted hundred times. The pH of the solution becomes
   (a) 6.95 (b) 6
   (c) 4 (d) 8
8. A solution contains 10 ml of 0.1N NaOH and 10ml of 0.05N H_2SO_4. The pH of this solution is
   (a) 1 (b) < 7
   (c) > 7 (d) 0
9. Which of the following mixture will have the pH close to 1?
   (a) 100ml of M/10 HCl + 100 ml of M/10 NaOH
   (b) 55ml of M/10 HCl + 45ml of M/10 NaOH
   (c) 10ml of M/10 HCl + 90ml of M/10 NaOH
   (d) 75ml of M/5 HCl + 25ml of M/5 NaOH
10. Which of the following salts, when dissolved in water, undergoes hydrolysis ?
    (a) NaCl (b) NH_4Cl
    (c) KCl (d) $Na_2 SO_4$
11. The pH of 0.1M solution of the given salts increase in the order

(a) $NaCl < NH_4Cl < NaCN < HCl$
(b) $HCl < NH_4Cl < NaCl < NaCN$
(c) $NaCN < NH_4Cl < NaCl < HCl$
(d) $HCl < NaCl < NaCN < NH_4Cl$

12. One mole of SO_3 was placed in a two litre vessel at a certain temperature. The following equilibrium was established in the vessel
$2\ SO_3\ (g)\ \ 2\ SO_2\ (g) + O_2\ (g)$.
At equilibrium, the vessel was found to contain 0.5 mole of SO_3. The value of K would be
(a) 0.25 (b) 0.125
(c) 0.5 (d) 1

13. The value of ΔG° for a reaction, having $K_c = 1$, would be
(a) – RT (b) – 1
(c) 0 (d) + RT

14. For a reaction, the value of K_c increases with increase in temperature. The ΔH for the reaction would be
(a) positive (b) negative
(c) zero
(d) can not be predicted

15. In a reaction, $A + 2B\ \ 2\ C$, if 2.0 moles of A, 3.0 moles of B and 2.0 moles of C are placed in a flask of 2 L capacity and equilibrium concentration of C is 0.5 mole L^{-1}. The value of equilibrium constant Kc of the reaction is
(a) 0.073 (b) 0.147
(c) 0.05 (d) 0.026

16. At constant temperature, the equilibrium constant (Kp) for the decomposition reaction
$N_2O_4\ 2\ NO$ is expressed by $K_p = (4x^2P) / (1 - x^2)$ where P = pressure and x = extent of decomposition. Which one of the following statements is true ?
(a) Kp increases with increase of P
(b) Kp increases with increase of x
(c) Kp increases with decrease of x
(d) Kp remains constant with change in P and x

17. pH of 0.01 M $(NH_4)_2SO_4$ and 0.02 M NH_4OH buffer (p^{Ka} of $NH_4^+ = 9.26$) is
(a) 4.74 + log 2 (b) 4.74 – log 2
(c) 4.74 + log 1 (d) 9.26 + log 1

18. HCOOH and CH_3COOH solution have equal pH. If K_1/K_2 (ratio of acid dissociation constants) is 4, their molar concentration will be
(a) 2 (b) 0.5

(c) 4 (d) 0.25

19. pH of $Ca(OH)_2$ is 12. Milli equivalents of $Ca(OH)_2$ present in 100 ml. solution will be
(a) 1 (b) 0.5
(c) 0.05 (d) 5

20. A buffer solution contains 100 ml. of 0.01M CH_3COOH and 200 ml of 0.02 M CH_3COONa. 700 ml. of H_2O is further added. The pH values before and after dilution are respectively
(a) 5.04, 5.04 (b) 5.04, 0.504
(c) 5.04, 1.54 (d) 5.34, 5.34

Answer Keys

1. (a) 2. (a) 3. (b) 4. (c) 5. (c) 6. (c) 7. (a) 8. (c) 9. (d) 10. (b)
11. (b) 12. (b) 13. (c) 14. (a) 15. (c) 16. (d) 17. (d) 18. (d) 19. (a) 20. (d)