1. The conjugate acid of NH_2^- is

(1) NH_3 (2) NH_2OH

(3) NH_4^+ (4) N_2H_4

2. Which of the following is not a Bronsted acid:-

(1) $CH_3NH_4^+$ (2) CH_3COO^-

(3) H_2O (4) HSO_4^-

3. In the reaction

$HNO_3 + H_2O \rightleftharpoons H_3O^+ + NO_3^-$, the conjugate base of HNO_3 is :-

(1) H_2O (2) H_3O^+

(3) NO_3^- (4) H_3O^+ and NO_3^-

4. Out of the following, amphiprotic species in aqueous medium are

I: HPO_3^{2-} II OH^-

III $H_2PO_4^-$ IV HCO_3^-

(1) I, III, IV (2) I and III

(3) III and IV (4) All

5. When ammonia is added to water, it decreases the concentration of which of the following ion

(1) OH^- (2) H_3O^+

(3) NH_4^+ (4) NH_4^+ & OH^-

6. Which of the following pair is Lewis acid & Lewis base & Product of these is also Lewis base

(1) BF_3 , NH_3 (2) $SiCl_4$, $2Cl^-$

(3) $CH_3^{\oplus}$, $^{\ominus}OC_2H_5$ (4) All of these

7. Ionic product of water will increase, if :-

(1) Pressure is decreased

(2) H^+ is added

(3) OH^- is increased

(4) Temperature is increased

8. At 60°C, pure water has $[H_3O^+]=10^{-6.7}$mol/lit. what is the value of K_W at 60°C :-

(1) 10^{-6} (2) 10^{-12} (3) 10^{-67} (4) $10^{-13.4}$

9. The pH of solution is increased from 3 to 6. Its H^+ ion conc. will be :-

(1) Reduced to half

(2) Doubled

(3) Reduced by 1000 times

(4) Increased by 1000 times

10. Degree of dissociation of 0.1 N CH_3COOH is :- (Dissociation constant = 1×10^{-5})

(1) 10^{-5} (2) 10^{-4} (3) 10^{-3} (4) 10^{-2}

11. The pH of a 0.02 M ammonia solution which is 5% ionised will be :-

(1) 2 (2) 11 (3) 5 (4) 7

12. The pH of an aqueous solution of 1.0 M solution of a weak monoprotic acid which is 1% ionised is

(1) 1 (2) 2 (3) 3 (4) 11

13. The concentration of $[H^+]$ and concentration of $[OH]^-$ of a 0.1 M aqueous solution of 2% ionised weak acid is [ionic product of water $=1 \times 10^{-14}$]

(1) 0.02×10^{-3} M and 5×10^{-11} M

(2) 1×10^{-3} M and 3×10^{-11} M

(3) 2×10^{-3} M and 5×10^{-12} M

(4) 3×10^{-2} M and 4×10^{-13} M

14. What is the quantity of NaOH present in 250 cc of the solution, so that it gives a pH = 13 :-

(1) 10^{-13} g (2) 10^{-1} g (3) 1.0 g (4) 4.0 g

15. An aqueous solution of HCl is 10^{-9} M HCl. The pH of the solution should be:-

(1) 9 (2) Between 6 and 7

(3) 7 (4) Unpredictable

16. Which one of the following has highest pH:-

(1) Distilled water

(2) 1 M NH_3

(3) 1 M NaOH

(4) Water saturated with chlorine

17. 8 gm NaOH and 4.9 gm H_2SO_4 are present in one litre of the solution. What is its pH

(1) 1 (2) 13 (3) 12 (4) 2

18. 10 ml of $\frac{M}{200}$ H_2SO_4 is mixed with 40 ml of $\frac{M}{200}$ H_2SO_4. The pH of the resulting solution is

(1) 1 (2) 2

(3) 2.3 (4) none of these

19. Which of the following solution will have pH close to 1.0?

(1) 100 ml of M/100 HCl + 100 ml of M/10 NaOH

(2) 55 ml of M/10 HCl + 45 ml of M/10 NaOH

(3) 10 ml of M/10 HCl + 90 ml of M/10 NaOH

(4) 75 ml of M/5 HCl + 25 ml of M/5 NaOH

20. A solution with pH 2.0 is more acidic than the one with pH 6.0 by a factor of:

(1) 3 (2) 4 (3) 3000 (4) 10000

21. The first and second dissociation constants of an acid H_2A are 1.0×10^{-5} and 5.0×10^{-10} respectively. The overall dissociation constant of the acid will be:

(1) 5.0×10^{-5} (2) 5.0×10^{15}

(3) 5.0×10^{-15} (4) 0.2×10^{5}

22. pH of an aqueous solution of NaCl at 85°C should be

(1) 7 (2) > 7 (3) < 7 (4) 0

23. The degree of hydrolysis of a salt of weak acid and weak base in it's 0.1 M solution is found to be 50%. If the molarity of the solution is 0.2 M, the percentage hydrolysis of the salt should be

(1) 100% (2) 50%

(3) 25% (4) none of these

24. If 40 ml of 0.2 M KOH is added to 160 ml of 0.1 M HCOOH [$K_a = 2\times10^{-4}$], the pOH of the resulting solution is

(1) 3.4 (2) 3.7

(3) 7 (4) 10.3

25. The pK_a of a weak acid (HA) is 4.5. The pOH of an aqueous buffered solution of HA in which 50% of the acid is ionized is :

(1) 4.5 (2) 2.5

(3) 9.5 (4) 7.0

26. To a 50 ml. of 0.05M formic acid, how much volume of 0.10M sodium formate must be added to get a buffer solution of pH = 4.0 ?

(pK_a of the acid is 3.7) (log2 = 0.3)

(1) 40 ml. (2) 4 ml.

(3) 50 ml. (4) 100 ml.

27. Which can act as buffer :-

(1) NH_4OH + NaOH

(2) HCOOH + HCl

(3) 40 ml. of 0.1 M NaCN + 20 ml. of 0.1 M HCl

(4) All of them

28. Calculate the pH of a buffer prepared by mixing 600 cc of 0.6 M NH_3 and 400 cc of 0.5 M NH_4Cl. K_b for $NH_3 = 1.8 \times 10^{-5}$, (log 1.8 = 0.26)

(1) 11.3 (2) 9.0 (3) 9.52 (4) 5

29. When 0.02 moles of NaOH are added to a litre of buffer solution, its pH changes from 5.75 to 5.80. What is its buffer capacity :-

(1) 0.4 (2) 0.05 (3) – 0.05 (4) 2.5

30. Calculate the pH range in which an acid indicator with K_{acid} (indicator) $= 1.0 \times 10^{-5}$ changes colour when the concentration of the indicator is 1×10^{-3}M.

(1) 5 ± 1 (2) 11 ± 1 (3) 3 ± 1 (4) 8 ± 1

ANSWER KEY — Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	1	2	3	3	2	3	4	4	3	4
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	2	2	3	3	2	3	2	2	4	4
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	3	3	2	4	3	3	3	3	1	1