



DPP-1 [Acid-Base Titration] Chapter: Practical Physical Chemistry

“Bas ek question uthao... Perfect hone ki zarurat nahi... Shuru karo—baaki sab khud ho jayega.”

TYPE-1 : Indicator

Q.1. The color of phenolphthalein indicator in acid solution is

- | | |
|------------|-------------------|
| (1) Pink | (3) Colourless |
| (2) Yellow | (4) Change orange |

Q.2. Phenolphthalein color in basic medium is

- | | |
|------------|----------------|
| (1) Pink | (3) Yellow |
| (2) Orange | (4) Colourless |

Q.3. Methyl orange is

- (1) Red in acidic medium, yellow in basic medium
- (2) Yellow in acidic medium, pink in basic medium
- (3) Colorless in acidic medium, pink in basic medium
- (4) Pink in acidic medium, colorless in basic medium

Q.4. The pink colour of phenolphthalein in alkaline medium is due to –

- | | |
|------------------|------------------------|
| (1) Negative ion | (3) OH^- ions |
| (2) Positive ion | (4) Neutral form |

Q.5. Which indicator works in the pH range 8–9.8

- | | |
|---------------------|----------------|
| (1) Phenolphthalein | (3) Methyl red |
| (2) Methyl orange | (4) Litmus |

Q.6. Phenolphthalein is not a good indicator for titrating

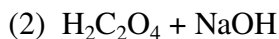
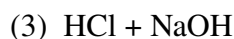
- (1) NaOH against oxalic acid
- (2) NaOH against HCl
- (3) NaOH against H_2SO_4
- (4) Ferrous sulphate against KMnO_4

Q.7. Phenolphthalein is most suitable indicator for the titration of

- (1) CH_3COOH and NH_4OH
- (2) CH_3COOH and NaOH

- (3) HCl and NH_4OH
- (4) H_2CO_3 and NH_4OH

- Q.8. When basic solution is titrated against HCl in the burette with Methyl orange indicator, the end point is the color change from**
- (1) Yellow to Violet
 - (2) Orange to yellow
 - (3) Appearance of Pink color
 - (4) Yellow to orange
- Q.9. In Base vs. Acid titration, at the end point methyl orange is present as**
- (1) Quinonoid
 - (2) heterocyclic form
 - (3) Phenolic form
 - (4) Benzenoid form
- Q.10. Which of the following is used as an indicator in the titration of a strong acid and a weak base?**
- (1) Methyl orange
 - (2) Phenolphthalein
 - (3) Thymal blue
 - (4) Fluorescein
- Q.11. The ideal indicator for the titration of strong acid and weak base should have a pH range between ...**
- (1) 3–5
 - (2) 4–6
 - (3) 6–8
 - (4) 7–9
- Q.12. In the volumetric estimation of HCl, if we make use of phenolphthalein as an indicator, which base is unsuitable for the titration?**
- (1) NaOH
 - (2) RbOH
 - (3) KOH
 - (4) NH_4OH
- Q.13. What is the suitable indicator for titration of NaOH and oxalic acid?**
- (1) Methyl orange
 - (2) Methyl red
 - (3) Phenolphthalein
 - (4) Starch solution
- Q.14. Phenolphthalein does not act as an indicator for the titration between:**
- (1) KOH and H_2SO_4
 - (2) NaOH and CH_3COOH
 - (3) Oxalic acid and KMnO_4
 - (4) $\text{Ba}(\text{OH})_2$ and HCl
- Q.15. For weak acid strong base titration, the indicator used is:**
- (1) Potassium di-chromate
 - (2) Methyl orange
 - (3) Litmus
 - (4) Phenolphthalein
- Q.16. From the following in which titration methyl orange is a best indicator:**



Q.17. When 20 mL of $\frac{M}{20}$ NaOH are added to 10 mL of $\frac{M}{10}$ HCl, the resulting solution will:

- (1) Turn blue litmus red
- (2) Turn phenolphthalein solution
- (3) Turn methyl orange red
- (4) Will have no effect on either red or blue litmus

Q.18. Which is the best choice for weak base-strong acid titration?

- (1) Methyl red
- (2) Litmus
- (3) Phenol red
- (4) Phenolphthalein

Q.19. Incorrect statement for the use of indicators in acid-base titration is

- (1) Methyl orange may be used for a weak acid vs weak base titration
- (2) Methyl orange is a suitable indicator for a strong acid vs weak base titration
- (3) Phenolphthalein is a suitable indicator for a weak acid vs strong base titration
- (4) Phenolphthalein may be used for a strong acid vs strong base titration

Q.20. An alkali is titrated against an acid with methyl orange as indicator, which of the following is a correct combination?

	Base	Acid	End point
(1)	Strong	Strong	Pinkish red to yellow
(2)	Weak	Strong	Yellow to pinkish red
(3)	Strong	Strong	Pink to colourless
(4)	Weak	Strong	Colourless to pink

Q.21. The indicator which is not added in titration flask but kept on a spot plate is

- (1) Self indicator
- (2) External indicator
- (3) Internal indicator
- (4) None of these

Q.22. The rapid change of pH near the stoichiometric point of an acid-base titration is the basis of indicator detection. pH of the solution is related to ratio of the concentrations of the conjugate acid (HIn) and base (In^-) forms of the indicator by the expression:

(1) $\log \frac{[\text{HIn}]}{[\text{In}^-]} = \text{p}K_{\text{In}} - \text{pH}$

(2) $\log \frac{[\text{HIn}]}{[\text{In}^-]} = \text{pH} - \text{p}K_{\text{In}}$

(3) $\log \frac{[\text{In}^-]}{[\text{HIn}]} = \text{pH} + \text{p}K_{\text{In}}$

(4) $\log \frac{[\text{In}^-]}{[\text{HIn}]} = \text{p}K_{\text{In}} - \text{pH}$

TYPE-2 : Numerical / Calculation Based

- Q.23. The number of gms of solute per 100 ml of solution is known as**
- (1) Normality (3) % weight by volume
(2) Molarity (4) Mole fraction
- Q.24. The pH of titration mixture for strong acid–strong base titration at equivalence point is**
- (1) 4 (2) 2.7 (3) 7 (4) 9.2
- Q.25. The equivalent weight of sodium carbonate [Na₂CO₃] is**
- (1) 40 (3) 55.85
(2) 53 (4) 63
- Q.26. Find the concentration of HCl, if 10 ml of 0.5 Ca(OH)₂ is required to titrate 50 ml of HCl.**
- (1) 1/10 M (3) 5 M
(2) 1/5 M (4) 10 M
- Q.27. If 20 ml of 0.25 N strong acid and 30 ml of 0.2 N of strong base are mixed, then the resulting solution is**
- (1) 0.25 N basic (3) 0.25 N acidic
(2) 0.2 N acidic (4) 0.02 N basic
- Q.28. 10 ml of 10 M H₂SO₄ is mixed to 100 ml 1M NaOH solution. The resultant solution will be**
- (1) Acidic (3) Weakly alkaline
(2) Neutral (4) Strongly alkaline
- Q.29. Phosphoric acid (H₃PO₄) is tribasic acid and one of its salt is sodium dihydrogen phosphate (NaH₂PO₄). What volume of 1 M NaOH solution should be added to 12 g of sodium dihydrogen phosphate (mol. wt. 120) to exactly convert it into trisodium phosphate Na₃PO₄?**
- (1) 80 ml (3) 200 ml
(2) 100 ml (4) 300 ml
- Q.30. 10 ml of concentrated HCl were diluted to 1 litre. 20 ml of this diluted solution required 25 ml of 0.1 N sodium hydroxide solution for complete neutralization, the normality of the concentrated hydrochloric acid will be**
- (1) 8.0 (3) 12.5
(2) 9.5 (4) 15.0
- Q.31. 25 ml of the given HCl solution requires 30 mL of 0.1 M sodium carbonate solution. What is the volume of this HCl solution required to titrate 30 mL of 0.2 M aqueous NaOH solution?**

- (1) 25 mL
- (2) 50 mL

- (3) 12.5 mL
- (4) 75 mL

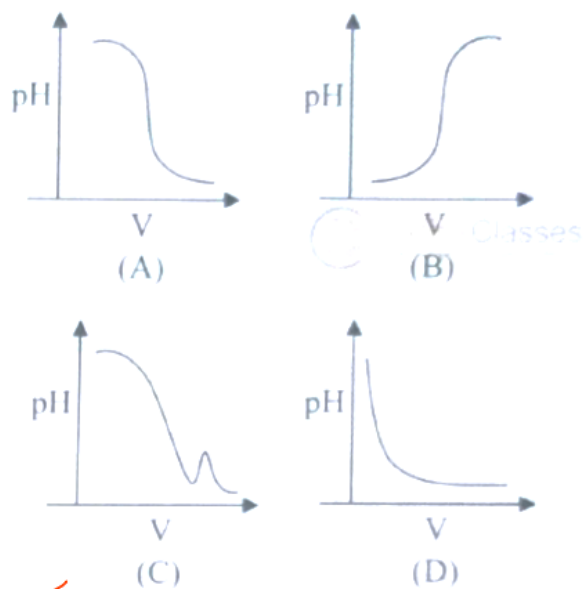
Q.32. 50 mL of 0.5 M oxalic acid is needed to neutralize 25 mL of sodium hydroxide solution. The amount of NaOH in 50 mL of the given sodium hydroxide solution is

- (1) 4 g
- (2) 20 g

- (3) 80 g
- (4) 10 g

TYPE-3 : Graph Based

Q.33. In an acid-base titration, 0.1 M HCl solution was added to the NaOH solution of unknown strength. Which of the following correctly shows the change of pH of the titration mixture

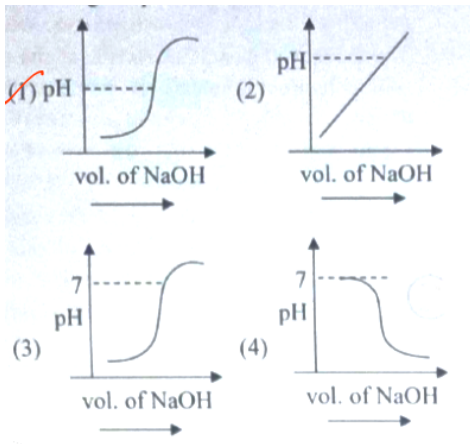


in this experiment?

- (1) (A)
- (2) (C)

- (3) (D)
- (4) (B)

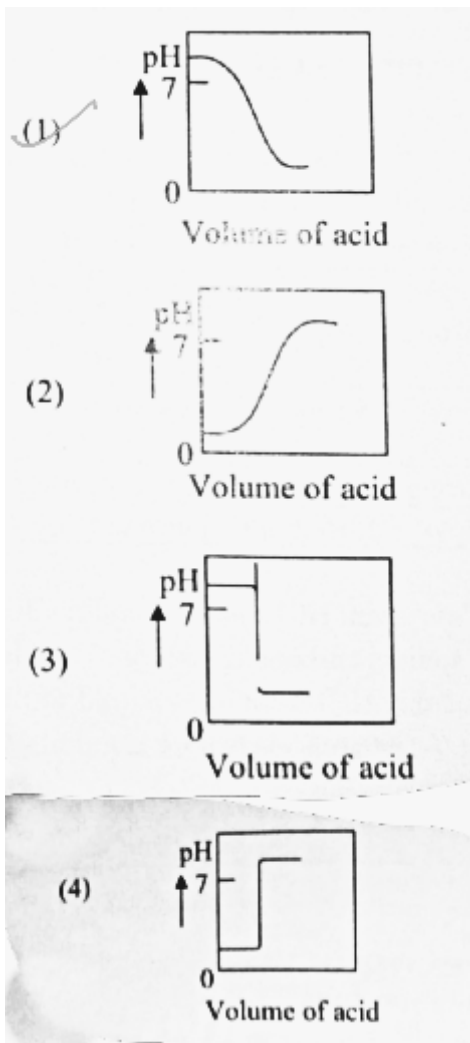
Q.34. 100 mL of 0.1 M HCl is taken in a beaker and to it 100 mL of 0.1M NaOH is added in steps of 2 mL and the pH is continuously measured. Which of the following graphs correctly depicts the change in pH?



- (1) (1)
- (2) (2)

- (3) (3)
- (4) (4)

Q.35. The Plot of pH-metric titration of weak base NH_4OH vs strong acid HCl looks like

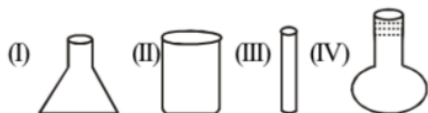


TYPE-4 : Assertion–Reason / Statement Based

Instructions for Q.47, Q.22, Q.28:

- (1) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (2) Both Assertion and Reason are true but Reason is NOT the correct explanation of Assertion.
- (3) Assertion is true but Reason is false.
- (4) Assertion is false but Reason is true.

Q.36. Assertion (A): Ind flask is more suitable than first for titration.



Reason (R): It is difficult to add titrant in first.

- | | |
|---|----------------------------------|
| (1) Both (A) and (R) are true and (R) is the correct explanation of (A) | (3) (A) is true but (R) is false |
| (2) Both (A) and (R) are true but (R) is not the correct explanation of (A) | (4) Both (A) and (R) are false |

Q.37. Assertion (A): Phenolphthalein is a pH dependent indicator, remains colourless in acidic solution and gives pink colour in basic medium.

Reason (R): Phenolphthalein is a weak acid. It doesn't dissociate in basic medium.

- (1) Both Assertion and Reason are true and Reason is the correct explanation of Assertion
- (2) Both Assertion and Reason are true but Reason is NOT the correct explanation of Assertion
- (3) Assertion is true but Reason is false
- (4) Assertion is false but Reason is true

Q.38. Assertion (A): An aqueous solution of KOH when for volumetric analysis, its concentration should be checked before the use.

Reason (R): On aging, KOH solution absorbs atmospheric CO_2 .

- (1) Assertion is not correct but Reason is correct
- (2) Both Assertion and Reason are correct but reason is not the correct explanation of Assertion
- (3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion
- (4) Assertion is correct but Reason is not correct

Instructions for Statement-based questions:

- (1) Both Statement I and Statement II are incorrect.
- (2) Both Statement I and Statement II are correct.
- (3) Statement I is incorrect but Statement II is correct.
- (4) Statement I is correct but Statement II is incorrect.

Q.39. Statement I: Methyl orange is a weak acid.

Statement II: The benzenoid form of methyl orange is more intense/deeply coloured than the quinonoid form.

- (1) Both Statement I and Statement II are incorrect

- (2) Both Statement I and Statement II are correct
- (3) Statement I is incorrect but Statement II is correct
- (4) Statement I is correct but Statement II is incorrect

Q.40. Statement I: In the titration between strong acid and weak base methyl orange is suitable as an indicator.

Statement II: For titration of acetic acid with NaOH phenolphthalein is not a suitable indicator.

- (1) Statement I is false but statement II is true
- (2) Both statement I and statement II are false
- (3) Statement I is true but statement II is false
- (4) Both statement I and statement II are true

TYPE-5 : Miscellaneous / Application Based

Q.41. A neutralization reaction is a reaction taking place between the acids and the bases.

- (1) double displacement
- (2) displacement
- (3) substitution
- (4) addition

Q.42. A precipitation reaction is a double displacement reaction taking place between

- (1) acids and bases
- (2) two aqueous ionic compounds
- (3) two bases
- (4) two acids

Q.43. Which of the following is a general property of base

- (1) Taste Sour
- (2) Turn litmus red
- (3) Conduct electric current in solution
- (4) Concentration of H_3O^+ is greater than concentration of OH^-

Q.44. The reagent of known concentration which is taken in burette is

- (1) Titrand
- (2) Titration
- (3) Titrant
- (4) End point

Q.45. The unknown solution whose concentration is to be determined by titration is called

- (1) Titrand
- (2) Titration
- (3) Titrant
- (4) End point

Q.46. Process in which addition of titrant from burette into titration flask till titrant react completely is called

- (1) Titrand (3) Titrant
 (2) Titration (4) End point

Q.47. In titration colourless solution will change into light pink colour that point is called –

- (1) Equivalent point (3) Both (1) & (2)
 (2) End point (4) None of these

Q.48. Which is the minimum volume of solution which can be measured with the help of burette?

- (1) 0.15 ml (3) 0.1 ml
 (2) 1 ml (4) 10 ml

Q.49. The chemical reagent from which solution of required concentration can be prepared is

- (1) Secondary standard (3) Concentrated solution
 (2) Dilute solution (4) Primary standard

Q.50. Match the following:

1	Phosphoric acid	P	Strong base
2	Calcium hydroxide	Q	Strong acid
3	Nitric acid	R	Weak acid
4	Potassium hydroxide	S	Weak base

- (1) 1-R, 2-P, 3-S, 4-Q (3) 1-Q, 2-R, 3-P, 4-S
 (2) 1-R, 2-S, 3-Q, 4-P (4) 1-S, 2-Q, 3-R, 4-P

Q.51. Match the following:

1	Acetic acid	P	Strong base
2	Sodium bicarbonate	Q	Strong acid
3	Hydrochloric acid	R	Weak acid
4	Sodium hydroxide	S	Weak base

- (1) 1-R, 2-P, 3-S, 4-Q (3) 1-Q, 2-R, 3-P, 4-S
 (2) 1-S, 2-Q, 3-R, 4-P (4) 1-R, 2-S, 3-Q, 4-P

Q.52. Match the following:

1	Strong acid – Strong base Titration	P	Not performed practically
2	Strong base – Weak acid titration	Q	NH ₄ OH Vs HCl
3	Strong acid – Weak base titration	R	NaOH Vs HCl
4	Weak acid – Weak base titration	S	NaOH Vs CH ₃ COOH

- (1) 1-R, 2-P, 3-S, 4-Q
- (2) 1-R, 2-S, 3-P, 4-Q

- (3) 1-R, 2-S, 3-Q, 4-P
- (4) 1-S, 2-Q, 3-R, 4-P

Q.53. For standardising NaOH solution, which of the following is used as a primary standard?

- (1) Oxalic acid
- (2) Ferrous ammonium sulphate
- (3) Sodium tetraborate
- (4) Dil. HCl

**Q.54. The strength of an aqueous NaOH solution is most accurately determined by titrating:
(Note: Consider that an appropriate indicator is used)**

- (1) Aq. NaOH in a volumetric flask and concentrated H_2SO_4 in a conical flask
- (2) Aq. NaOH in a pipette and aqueous oxalic acid in a burette
- (3) Aq. NaOH in a burette and concentrated H_2SO_4 in a conical flask
- (4) Aq. NaOH in a burette and aqueous oxalic acid in a conical flask