Practice MCQ For Govt Pharmacist Exam, in this article we will solve, Practice MCQ on the topic acid base titrations under the subject Pharmaceutical inorganic chemistry of first semester. Read following article for your reference.

Acid Base Titrations » PHARMACAREERS

1.Which of the following is true about acid-base indicators?

A) They change color at a specific pH.

B) They are always acidic in nature.

C) They are used as primary standards.

D) They react with water to form salts.

2.Which of the following is a characteristic of a strong acid?

A) High pH

B) Partial ionization in water

C) Weak electrolyte behavior

D) Low pKa value

3.What is the primary purpose of an acid-base titration?

A) To determine the concentration of an unknown acid

B) To measure the pH of a solution

C) To study the color changes of indicators

D) To calculate the molar mass of a base

4.Which type of titration involves the reaction between a strong acid and a strong base?

A) Acid-alkali titration

B) Redox titration

C) Complexometric titration

D) Precipitation titration

5.The endpoint of an acid-base titration is determined by:

A) The color change of the indicator

B) The initial volume of the titrant

C) The pH of the solution

D) The temperature of the reaction mixture

6.Which of the following is a secondary standard in acid-base titration?

A) NaOH

B) HCl

C) K2Cr2O7

D) Na2CO3

7.What is the role of a buffer solution in an acid-base titration?

A) To neutralize excess titrant

B) To enhance the color change of the indicator

C) To maintain a constant pH during the titration

D) To increase the reaction rate

8.Which of the following is a weak base?

A) NaOH

B) NH3

C) KOH

D) Ca(OH)2

9.What is the pH of a neutral solution at 25°C?

A) 0

B) 7

C) 14

D) It varies with the concentration of H+ ions

10.Which acid-base theory defines an acid as a proton donor and a base as a proton acceptor?

A) Arrhenius theory

B) Lewis theory

C) Brønsted-Lowry theory

D) Gilbert-Lewis theory

11.Which of the following is true about acid-base indicators?

A) They change color at a specific pH.

B) They are always acidic in nature.

C) They are used as primary standards.

D) They react with water to form salts.

12.Which of the following is a characteristic of a strong acid?

A) High pH

B) Partial ionization in water

C) Weak electrolyte behavior

D) Low pKa value

13.What is the primary purpose of an acid-base titration?

A) To determine the concentration of an unknown acid

B) To measure the pH of a solution

C) To study the color changes of indicators

D) To calculate the molar mass of a base

14.Which type of titration involves the reaction between a strong acid and a strong base?

A) Acid-alkali titration

B) Redox titration

C) Complexometric titration

D) Precipitation titration

15.The endpoint of an acid-base titration is determined by:

A) The color change of the indicator

B) The initial volume of the titrant

C) The pH of the solution

D) The temperature of the reaction mixture

16.Which of the following is a secondary standard in acid-base titration?

A) NaOH

B) HCl

C) K2Cr2O7

D) Na2CO3

17.What is the role of a buffer solution in an acid-base titration?

A) To neutralize excess titrant

B) To enhance the color change of the indicator

C) To maintain a constant pH during the titration

D) To increase the reaction rate

18.Which of the following is a weak base?

A) NaOH

B) NH3

C) KOH

D) Ca(OH)2

19.What is the pH of a neutral solution at 25°C?

A) 0

B) 7

C) 14

D) It varies with the concentration of H+ ions

20.Which acid-base theory defines an acid as a proton donor and a base as a proton acceptor?

A) Arrhenius theory

B) Lewis theory

C) Brønsted-Lowry theory

D) Gilbert-Lewis theory

21.Which of the following combinations cannot produce a buffer solution?

A) HNO2 and NaNO2

B) HCN and NaCN

C) HClO4 and NaClO4

D) NH3 and (NH4)2SO4

E) NH3 and NH4Br

22.What is the pH of a solution composed of 0.20 M NH3 and 0.15 M NH4Cl?

A) 2.15

B) 4.62

C) 8.26

D) 9.38

E) 8.89

23.Calculate the ratio [CH3COOH]/[NaCH3COO] that gives a solution with pH = 5.00.

A) 0.28

B) 0.36

C) 0.44

D) 0.56

E) 0.63

24.Consider a solution which is 0.10 M in CH3COOH and 0.20 M in NaCH3COO. Which of the following statements is true?

A) If a small amount of NaOH is added, the pH decreases very slightly.

B) If NaOH is added, the OH- ions react with the CH3COO- ions.

C) If a small amount of HCl is added, the pH decreases very slightly.

D) If HCl is added, the H+ ions react with CH3COOH ions.

E) If more CH3COOH is added, the pH increases.

25.A buffer was prepared by mixing 1.00 mole of ammonia and 1.00 mole of ammonium chloride to form an aqueous solution with a total volume of 1.00 liter. To 500 mL of this solution, 30.0 mL of 1.00 M NaOH was added. What is the pH of this solution?

A) 8.96

B) 9.83

C) 9.31

D) 9.11

E) 9.57

26.How many grams of NaF would have to be added to 2.00 L of 0.100 M HF to yield a solution with a pH = 4.00?

A) 300 g

B) 36 g

C) 0.84 g

D) 6.9 g

E) 60. G

27.Calculate the pH that results when the following solutions are mixed:

(1) 35 mL of 0.20 M formic acid

(2) 55 mL of 0.10 M sodium formate

(3) 110 mL of water

A) 3.64

B) 3.11

C) 4.58

D) 3.39

E) 4.20

28.Consider an indicator that ionizes as shown below, with its Ka = 1.0 x 10^-4:

HIn + H2O ⇌ H3O+ + In-

Which of the following statements is true? (Select all that apply.)

(1) The predominant color in its acid range is yellow.

(2) In the middle of the pH range of its color change, a solution containing the indicator will probably be orange.

(3) At pH = 7.00, a solution containing this indicator (and no other colored species) will be red.

(4) At pH = 7.00, most of the indicator is in the un-ionized form.

(5) The pH at which the indicator changes color is pH = 4.

A) 1, 3, 5

B) 2, 4

C) 3, 4, 5

D) 1, 2, 3, 5

E) Another combination

29.What is the definition of a neutralization reaction?

A) A reaction between an acid and a base that produces a gas

B) A reaction between an acid and a base that forms a precipitate

C) A reaction between an acid and a base that results in the formation of salt and water

D) A reaction between an acid and a base that generates heat

30.Complete the following reaction: HCl + $Mg(OH)_2$ à

A) MgCl2 + O2

B) MgCl2 + CO2

C) MgCl2 + H2O

D) MgCl2 + CO2 + H2O

31.What is the pH range of acidic solutions?

A) 0-2

B) 7-14

C) 5-7

D) 0-7

32.A neutral solution contains:

A) No free ions

B) Salts of metals

C) Electrons and protons

D) Equal numbers of H+ and OH- ions

33.Neutralization reactions are:

A) Displacement reactions

B) Double displacement reactions

C) Decomposition reactions

D) Combination reactions

Answers

1. **A) They change color at a specific pH.** Acid-base indicators change color at a specific pH range.
2. **D) Low pKa value.** A strong acid is characterized by a low pKa value, indicating a higher tendency to donate protons.
3. **A) To determine the concentration of an unknown acid.** The primary purpose of an acid-base titration is to determine the concentration of an unknown acid or base.
4. **A) Acid-alkali titration.** The titration involving a strong acid and a strong base is referred to as an acid-alkali titration.
5. **A) The color change of the indicator.** The endpoint of an acid-base titration is determined by the color change of the indicator.
6. **A) NaOH.** Sodium hydroxide (NaOH) is a common secondary standard in acid-base titrations.
7. **C) To maintain a constant pH during the titration.** The role of a buffer solution in an acid-base titration is to maintain a constant pH.
8. **B) NH3.** Ammonia (NH3) is a weak base.
9. **B) 7.** The pH of a neutral solution at 25°C is 7.
10. **C) Brønsted-Lowry theory.** The Brønsted-Lowry theory defines an acid as a proton donor and a base as a proton acceptor.
11. **C) HClO4 and NaClO4.** A combination of a strong acid and its conjugate base, such as HClO4 and NaClO4, cannot produce a buffer solution.
12. **D) 9.38.** The pH of a solution composed of 0.20 M NH3 and 0.15 M NH4Cl is 9.38.
13. **B) 0.36.** The ratio [CH3COOH]/[NaCH3COO] that gives a solution with pH = 5.00 is 0.36.
14. **C) If a small amount of HCl is added, the pH decreases very slightly.** In a buffer solution, if a small amount of HCl is added, the pH decreases very slightly.
15. **A) 8.96.** The pH of the solution after adding 30.0 mL of 1.00 M NaOH to 500 mL of the buffer solution is 8.96.
16. **B) 36 g.** Approximately 36 g of NaF would have to be added to 2.00 L of 0.100 M HF to yield a solution with a pH = 4.00.
17. **D) 3.39.** The pH that results when the given solutions are mixed is 3.39.

18. **B) 2, 4.** The true statements are that in the middle of the pH range of its color change, a solution containing the indicator will probably be orange, and at pH = 7.00, most of the indicator is in the un-ionized form.
19. **C) A reaction between an acid and a base that results in the formation of salt and water.** A neutralization reaction is a reaction between an acid and a base that results in the formation of salt and water.
20. **C) $MgCl_2 + H_2O$.** The complete reaction is $HCl + Mg(OH)_2 \rightarrow MgCl_2 + 2H_2O$.
21. **D) 0-7.** The pH range of acidic solutions is 0-7.
22. **D) Equal numbers of H^+ and OH^- ions.** A neutral solution contains equal numbers of H^+ and OH^- ions.
23. **B) Double displacement reactions.** Neutralization reactions are double displacement reactions.
24. **C) $HClO_4$ and $NaClO_4$.** A buffer solution requires a weak acid/base and its conjugate. A strong acid like $HClO_4$ and its conjugate base $NaClO_4$ will not form a buffer.
25. **D) 9.38.** This requires using the Henderson-Hasselbalch equation for a base buffer.
26. **B) 0.36.** This can be solved using the Henderson-Hasselbalch equation for acids.
27. **C) If a small amount of HCl is added, the pH decreases very slightly.** This is a characteristic of a buffer solution.
28. **A) 8.96.** This requires calculating the change in concentrations due to the added NaOH and then using the Henderson-Hasselbalch equation.
29. **B) 36 g.** This involves calculating the required concentration of F^- and then converting it to grams.
30. **D) 3.39.** This involves calculating the final concentrations of formic acid and formate after dilution and then using the Henderson-Hasselbalch equation.
31. **B) 2, 4.** The true statements are that in the middle of the pH range of its color change, a solution containing the indicator will probably be orange, and at pH = 7.00, most of the indicator is in the un-ionized form.
32. **C) A reaction between an acid and a base that results in the formation of salt and water.**
33. **C) $MgCl_2 + H_2O$.** The balanced equation is $2HCl + Mg(OH)_2 \rightarrow MgCl_2 + 2H_2O$.