- Acids, Bases Theory And pH Scale
- Buffer Solution: Buffer Equation and Buffer Capacity
- Buffered Isotonic Solutions
- Major Extracellular and Intracellular Electrolytes
- Electrolytes Used in Replacement Therapy and ORS
- Dental Products

1. Which of the following is NOT a characteristic of a strong acid?

a) High degree of ionization in water

b) Low pH

c) Complete dissociation in water

d) Slow reaction with water

2. Which acid-base theory defines acids as electron acceptors?

a) Arrhenius

b) Brønsted-Lowry

c) Lewis

d) None of the above

3. Calculate the pH of a 0.01 M HCl solution.

a) 1

b) 2

c) 3

d) 4

4. What is the pOH of a solution with a pH of 9?

a) 3

b) 4

c) 5

d) 6

5. Which of the following is NOT a component of the Henderson-Hasselbalch equation?

a) pKa

b) pH

c) Concentration of the acid

d) Concentration of the base

6. A buffer solution resists changes in pH because:

a) It contains a high concentration of water.

b) It contains a high concentration of salt.

c) It contains a weak acid and its conjugate base.

d) It contains a strong acid and a strong base.

7. What happens to the pH of a buffered solution when a small amount of strong acid is added?

a) The pH increases significantly.

b) The pH decreases significantly.

c) The pH remains relatively constant.

d) The pH fluctuates wildly.

8. Which of the following factors does NOT significantly affect buffer capacity?

a) Temperature

b) Concentration of the buffer components

c) The pKa of the weak acid

d) The volume of the buffer solution

9. Which of the following is NOT a characteristic of an isotonic solution?

a) Same osmotic pressure as the surrounding cells

b) Causes cell shrinkage

c) Maintains cell integrity

d) No net movement of water across the cell membrane

10. Why is it important to maintain electrolyte balance in the body?

a) To ensure proper nerve function

b) To maintain fluid balance

c) To regulate muscle contractions

d) All of the above

11. Which electrolyte is the most abundant cation in the extracellular fluid?

a) Sodium

b) Potassium

c) Calcium

d) Magnesium

12. Which electrolyte is the most abundant anion in the intracellular fluid?

a) Chloride

b) Phosphate

c) Bicarbonate

d) Sulfate

13. Oral Rehydration Solutions (ORS) are primarily used to treat:

a) Dehydration due to diarrhea

b) Hypoglycemia

c) Hypernatremia

d) Anemia

14. Which of the following is NOT a typical component of an ORS solution?

a) Glucose

b) Sodium

c) Potassium

d) Calcium

15. What is the primary role of fluoride in toothpaste?

a) To whiten teeth

b) To prevent tooth decay

c) To freshen breath

d) To remove plaque

16. Which of the following is NOT a common dental procedure?

a) Endoscopy

b) Root canal therapy

c) Dental implants

d) Orthodontics

17. What is the primary function of saliva?

a) To aid in digestion

b) To lubricate food

c) To protect teeth from decay

d) All of the above

18. Which of the following is NOT a characteristic of a Lewis acid?

a) Electron donor

b) Electron acceptor

c) Can form a coordinate covalent bond

d) Can accept a lone pair of electrons

19. What is the conjugate base of H_2CO_3 (carbonic acid)?

a) HCO_3^- (bicarbonate)

b) CO_2 (carbon dioxide)

c) H_3O^+ (hydronium ion)

d) OH^- (hydroxide ion)

20. A solution with a pH of 3 is how many times more acidic than a solution with a pH of 5?

a) 2 times

b) 5 times

c) 10 times

d) 100 times

21. Which of the following indicators is commonly used in acid-base titrations?

a) Litmus paper

b) Phenolphthalein

c) Bromothymol blue

d) All of the above

22. What happens to the pH of blood when carbon dioxide levels increase?

a) pH increases

b) pH decreases

c) pH remains unchanged

d) pH fluctuates unpredictably

23. Which organ plays a crucial role in regulating blood pH?

a) Liver

b) Lungs

c) Kidneys

d) Spleen

24. What is the primary cause of metabolic acidosis?

a) Excessive production of lactic acid

b) Hyperventilation

c) Respiratory failure

d) Excessive vomiting

25. What is the primary cause of respiratory alkalosis?

a) Hypoventilation

b) Hyperventilation

c) Kidney failure

d) Excessive alcohol consumption

26. Which of the following is NOT a function of electrolytes in the body?

a) Maintaining blood pressure

b) Regulating body temperature

c) Transmitting nerve impulses

d) Facilitating muscle contractions

27. Which electrolyte is essential for proper muscle and nerve function?

a) Sodium

b) Potassium

c) Calcium

d) Magnesium

28. What is the primary function of dental implants?

a) To whiten teeth

b) To replace missing teeth

c) To prevent cavities

d) To improve the appearance of teeth

29. Which of the following is NOT a type of denture?

a) Complete denture

b) Partial denture

c) Implant-supported denture

d) Inlay denture

30. What is the primary goal of orthodontic treatment?

a) To improve the appearance of teeth

b) To improve the function of teeth

c) To prevent tooth decay

d) To strengthen tooth enamel

31. Which of the following is NOT a type of orthodontic appliance?

a) Braces

b) Retainers

c) Dental implants

d) Clear aligners

32. What is the main difference between clear aligners and traditional braces?

a) Clear aligners are more visible.

b) Clear aligners are removable.

c) Clear aligners are more expensive.

d) Clear aligners are only suitable for minor corrections.

33. Which of the following is NOT a characteristic of a strong base?

a) High pH

b) Complete dissociation in water

c) Low concentration of hydroxide ions

d) Reacts readily with acids

34. Which of the following is an example of a strong acid?

a) Acetic acid

b) Hydrochloric acid

c) Carbonic acid

d) Lactic acid

35. Which of the following is an example of a weak base?

a) Sodium hydroxide

b) Ammonia

c) Potassium hydroxide

d) Calcium hydroxide

36. What is the relationship between pKa and the strength of an acid?

a) Higher pKa indicates a stronger acid.

b) Lower pKa indicates a stronger acid.

c) pKa is not related to acid strength.

d) pKa is only relevant for strong acids.

37. What is the pH of a solution with a hydrogen ion concentration of 1 x 10^-8 M?

a) 7

b) 8

c) 9

d) 10

38. Which of the following is NOT a characteristic of a buffer solution?

a) Resists changes in pH upon the addition of small amounts of acid or base

b) Contains a high concentration of a strong acid

c) Contains a weak acid and its conjugate base

d) Can help maintain a stable pH in biological systems

39. What is the primary function of a buffer solution in the human body?

a) To regulate blood glucose levels

b) To maintain blood pressure

c) To maintain blood pH

d) To transport oxygen

40. Which of the following is NOT a factor that affects the solubility of electrolytes?

a) Temperature

b) Pressure

c) Particle size

d) Surface area of the solute

41. Which of the following is NOT a factor that affects the solubility of electrolytes?

a) Temperature

b) Pressure

c) pH

d) Surface area of the solute

42. What is the primary function of electrolytes in nerve impulse transmission?

a) To provide energy for nerve cells

b) To maintain the resting membrane potential

c) To insulate nerve fibers

d) To increase the speed of nerve impulses

43. Which of the following is NOT a common symptom of electrolyte imbalance?

a) Muscle cramps

b) Fatigue

c) Increased appetite

d) Irregular heartbeat

44. What is the primary function of dental floss?

a) To whiten teeth

b) To remove plaque from between teeth

c) To massage the gums

d) To freshen breath

45. Which of the following is NOT a common ingredient in toothpaste?

a) Fluoride

b) Detergent

c) Abrasive

d) Sugar

46. What is the primary cause of tooth decay?

a) Poor oral hygiene

b) Excessive sugar consumption

c) Acid erosion from acidic foods and drinks

d) All of the above

47. What is the role of the tongue in oral health?

a) To aid in chewing and swallowing

b) To help distribute saliva

c) To contribute to speech

d) All of the above

48. What is the primary function of dental bridges?

a) To replace a single missing tooth

b) To replace multiple missing teeth

c) To improve the appearance of teeth

d) To prevent tooth decay

49. Which of the following is NOT a common complication associated with dental implants?

a) Infection

b) Nerve damage

c) Tooth decay

d) Gum disease

50. What is the primary goal of orthodontics?

a) To improve the appearance of teeth

b) To improve the function of teeth

c) To prevent tooth decay

d) To strengthen tooth enamel

51. Which of the following is NOT a type of orthodontic appliance?

a) Braces

b) Retainers

c) Dental implants

d) Clear aligners

52. What is the primary function of saliva?

a) To aid in digestion

b) To lubricate food

c) To protect teeth from decay

d) All of the above

53. Which of the following is NOT a characteristic of a strong acid?

a) High degree of ionization in water

b) Low pH

c) Complete dissociation in water

d) Slow reaction with water

54. Which acid-base theory defines acids as electron acceptors?

a) Arrhenius

b) Brønsted-Lowry

c) Lewis

d) None of the above

55. Calculate the pH of a 0.01 M HCl solution.

a) 1

b) 2

c) 3

d) 4

56. What is the pOH of a solution with a pH of 9?

a) 3

b) 4

c) 5

d) 6

57. Which of the following is NOT a component of the Henderson-Hasselbalch equation?

a) pKa

b) pH

c) Concentration of the acid

d) Concentration of the base

58. A buffer solution resists changes in pH because:

a) It contains a high concentration of water.

b) It contains a high concentration of salt.

c) It contains a weak acid and its conjugate base.

d) It contains a strong acid and a strong base.

59. What happens to the pH of a buffered solution when a small amount of strong acid is added?

a) The pH increases significantly.

b) The pH decreases significantly.

c) The pH remains relatively constant.

d) The pH fluctuates wildly.

60. Which of the following factors does NOT significantly affect buffer capacity?

a) Temperature

b) Concentration of the buffer components

c) The pKa of the weak acid

d) The volume of the buffer solution

Answers

1. d) Slow reaction with water
2. c) Lewis
3. b) 2 (pH = -log[H+]; pH = -log(0.01) = 2)
4. c) 5 (pH + pOH = 14; pOH = 14 - 9 = 5)
5. d) Concentration of the base
6. c) It contains a weak acid and its conjugate base.
7. c) The pH remains relatively constant.
8. d) The volume of the buffer solution
9. b) Causes cell shrinkage
10. d) All of the above
11. a) Sodium
12. b) Phosphate
13. a) Dehydration due to diarrhea
14. d) Calcium
15. b) To prevent tooth decay
16. a) Endoscopy (Endoscopy is a medical procedure to examine the inside of the body)
17. d) All of the above
18. a) Electron donor
19. a) HCO_3^- (bicarbonate)
20. d) 100 times (Each pH unit represents a tenfold difference in hydrogen ion concentration)
21. d) All of the above
22. b) pH decreases
23. c) Kidneys
24. a) Excessive production of lactic acid
25. b) Hyperventilation
26. b) Regulating body temperature
27. b) Potassium
28. b) To replace missing teeth
29. d) Inlay denture (Inlays and onlays are types of dental fillings)
30. b) To improve the function of teeth
31. c) Dental implants
32. b) Clear aligners are removable.
33. c) Low concentration of hydroxide ions
34. b) Hydrochloric acid

35. b) Ammonia

36. b) Lower pKa indicates a stronger acid.

37. c) 9 (pH = -log[H+]; pH = -log(1 x 10^-8) = 8)

38. b) Contains a high concentration of a strong acid

39. c) To maintain blood pH

40. d) Surface area of the solute

41. d) Surface area of the solute

42. b) To maintain the resting membrane potential

43. c) Increased appetite

44. b) To remove plaque from between teeth

45. d) Sugar

46. d) All of the above

47. d) All of the above

48. b) To replace multiple missing teeth

49. c) Tooth decay (Dental implants themselves do not decay)

50. b) To improve the function of teeth

51. c) Dental implants

52. d) All of the above

53. d) Slow reaction with water

54. c) Lewis

55. b) 2 (pH = -log[H+]; pH = -log(0.01) = 2)

56. c) 5 (pH + pOH = 14; pOH = 14 - 9 = 5)

57. d) Concentration of the base

58. c) It contains a weak acid and its conjugate base.

59. c) The pH remains relatively constant.

60. d) The volume of the buffer solution