

1. Which of the following is considered to be a “lesser element” found in the body?
 - A) Carbon
 - B) Aluminum
 - C) Iodine
 - D) Calcium
 - E) Selenium

2. The rate of a chemical reaction is influenced by all of the following except:
 - A) the presence of the appropriate enzyme
 - B) the concentration of the reactants
 - C) the presence or absence of carbon
 - D) the temperature
 - E) the presence of the appropriate catalyst

3. The phospholipids that make up the plasma membranes of body cells have a _____ head region and a _____ tail region, a quality that results in the formation of the “lipid bilayer”.
 - A) non-polar, hydrophilic
 - B) non-polar, polar
 - C) polar, hydrophilic
 - D) hydrophobic, hydrophilic
 - E) hydrophilic, non-polar

4. Which of the following would be regarded as an organic molecule?
 - A) H₂O
 - B) CH₄
 - C) PO₄³⁻
 - D) NaCl
 - E) HCl

5. A bond in which electrons are shared unequally is called a(n):
 - A) Hydrogen bond
 - B) Ionic bond
 - C) Amphipathic bond
 - D) Polar covalent bond
 - E) Nonpolar covalent bond

6. True or False: The sugar forming part of the backbone of DNA strands is called deoxyribose.
- A) True
 - B) False
7. True or False: Most enzymes are non-specific, meaning they may bind to substrates indiscriminately and catalyze a wide range of reactions in the body.
- A) True
 - B) False
8. True or False: Ions are formed when atoms gain or lose one or more valence electrons and become positively or negatively charged.
- A) True
 - B) False
9. True or False: The lower the pH, the higher the H^+ concentration.
- A) True
 - B) False
10. Which of the following statements is FALSE regarding enzymes?
- A) They are specific; each one is able to bind only to certain substrates.
 - B) They lower the activation energy of a chemical reaction.
 - C) They are all capable of breaking down lipids.
 - D) They are unchanged at the end of the reaction.
 - E) They usually end with the suffix: -ase
11. Which of the following statements best characterizes lipid molecules?
- A) In general, they have few polar covalent bonds, and are therefore hydrophobic and insoluble in water.
 - B) They are most commonly found in the body functioning as enzymes.
 - C) Glucose, fructose, and galactose are classified as triglycerides.
 - D) Components of these molecules are joined together by peptide bonds.
 - E) They are toxic in the body and should be eradicated in all forms from the diet.

12. Which of the following is the major positive ion in the extracellular fluid?
- A) Nitrogen
 - B) Hydrogen
 - C) Magnesium
 - D) Potassium
 - E) Sodium
13. Salts are always:
- A) defined as dissociating in water into a hydrogen ion and an anion.
 - B) ionic compounds.
 - C) polar covalent compounds.
 - D) non-polar covalent compounds.
 - E) hydrogen bonded.
14. The smallest unit of matter that retains the properties and characteristics of an element is the:
- A) molecule
 - B) atom
 - C) electron
 - D) proton
 - E) nucleus
15. Which of the following is a good example of an acidic bodily fluid in a healthy individual?
- A) Semen
 - B) Cerebrospinal fluid
 - C) Bile
 - D) Blood
 - E) Gastric juice
16. Which of the following is NOT an example of a hydrogen bond?
- A) The bonds formed between H₂O molecules
 - B) The peptide bonds between amino acids
 - C) The bonds formed between base pairs of DNA and RNA nucleotides
 - D) The bonds formed along the polypeptide backbone of a protein to form its secondary structure, the alpha helices and beta pleated sheets.

17. True or False: Anions are formed when atoms gain or lose one or more valence electrons and become positively or negatively charged.
- A) True
 - B) False
18. Which of the following bodily fluids is strongly alkaline (basic)?
- A) blood
 - B) gastric juice
 - C) bile
 - D) vaginal fluid
 - E) saliva
19. True or False: Hydrogen bonds occur when the non-polar covalent bonds between hydrogen and other atoms create partially charged regions on those molecules that are attracted to oppositely charged particles.
- A) True
 - B) False
20. Which of the following is the major positive ion in the extracellular fluid?
- A) Na^+
 - B) Cl^-
 - C) H^+
 - D) K^+
 - E) Mg^{2+}
21. The following equation is an example of which of the following concepts?
- $$\text{ATP} + \text{H}_2\text{O} \rightarrow \text{ADP} + \text{Phosphate group} + \text{Energy}$$
- A) Dehydration synthesis reaction
 - B) Anabolic reaction
 - C) Phosphorylation
 - D) Hydrolysis
 - E) Phagocytosis
22. Which of the following particles has a neutral charge?
- A) Neutron
 - B) Atom
 - C) Proton
 - D) Neutron and atom
 - E) All of the above

23. What region of an atom contains the protons and neutrons?
- A) Cloud
 - B) Nucleus
 - C) Element
 - D) Ring
 - E) Shell
24. This is the number of protons or electrons.
- A) Mass number
 - B) Atomic number
 - C) Isotope
 - D) Valence shell
 - E) None of the above
25. As an atom's nucleus decays, it will emit radiation. This is seen in
- A) Compounds
 - B) Cations
 - C) Anions
 - D) Isotopes
 - E) Molecules
26. This refers to the atomic weight of all naturally occurring isotopes of an element.
- A) Mass number
 - B) Atomic number
 - C) Atomic mass
 - D) Ionic mass
 - E) Covalent mass
27. Which of the following particles plays a role in creating chemical bonds?
- A) Neutron
 - B) Electron
 - C) Proton
 - D) Electron and proton
 - E) All of the above

28. This is a negatively charged atom.
- A) Superoxide
 - B) Isotope
 - C) Catalyst
 - D) Ion
 - E) Valence
29. Which of the below provide an electrical current?
- A) Isotope
 - B) Ionic molecule
 - C) Compound
 - D) Electrolyte
 - E) Valence molecule
30. This type of bond requires a sharing of electrons.
- A) Covalent
 - B) Ionic
 - C) Hydrogen
 - D) Atomic
 - E) Electronic
31. This is the type of bond between the atoms forming a molecule of H_2O .
- A) Nonpolar covalent
 - B) Polar covalent
 - C) Hydrogen
 - D) Ionic
 - E) Atomic
32. Which of the following bonds provides the three dimensional structure of large molecules like proteins and DNA?
- A) Nonpolar covalent
 - B) Polar covalent
 - C) Hydrogen
 - D) Ionic
 - E) Atomic

33. This occurs when new bonds form or old bonds break between atoms.

- A) Ions
- B) Electrolytes
- C) Isotopes
- D) Chemical reaction
- E) Compounds

34. This is defined as the capacity to do work.

- A) Metabolism
- B) Electrolytes
- C) Chemical reaction
- D) Concentration
- E) Energy

35. This type of reaction will absorb more energy than it releases.

- A) Exergonic
- B) Endergonic
- C) Potential
- D) Kinetic
- E) Activation

36. An enzyme acts to

- A) Raise the activation energy needed
- B) Lower the activation energy needed
- C) Convert the activation energy into potential
- D) Convert the activation energy into kinetic
- E) Break a chemical reaction

37. This type of reaction will combine reactants to produce larger products.

- A) Synthesis
- B) Decomposition
- C) Potential
- D) Exchange
- E) Activated

38. This type of reaction will break larger reactants to produce smaller products.
- A) Synthesis
 - B) Decomposition
 - C) Potential
 - D) Exchange
 - E) Activated
39. This is the most abundant and most important inorganic compound in the body.
- A) Water
 - B) Oxygen gas
 - C) Carbon dioxide
 - D) Glucose
 - E) DNA
40. A solute that dissolves in water is.
- A) Hydrophobic
 - B) Hydrostatic
 - C) Hydroamoure
 - D) Hydrophilic
 - E) Hydrozone
41. In a typical body solution, the solvent is.
- A) Glucose
 - B) Lipids
 - C) Carbon dioxide
 - D) Water
 - E) Electrolyte
42. A solution with a pH value smaller than 7 would be a(n)
- A) Base
 - B) Salt
 - C) Acid
 - D) alkaline
 - E) concentrate

43. A substance that adds or removes Hydrogen ions from a solution is a(n)
- A) Base
 - B) Salt
 - C) Acid
 - D) Alkaline
 - E) Buffer
44. Which of the following is considered a proton donor?
- A) Acid
 - B) Base
 - C) Salt
 - D) Organic compound
 - E) Colloid
45. Glucose and fructose both have the chemical formula $C_6H_{12}O_6$ so they are considered
- A) Isotopes
 - B) Isometrics
 - C) Isolates
 - D) Isomers
 - E) Isotonics
46. Which of the following is a monosaccharide that is important in producing energy?
- A) Glucose
 - B) Sucrose
 - C) Lactose
 - D) Ribose
 - E) Deoxyribose
47. The major energy storage polysaccharide in humans is:
- A) Cellulose
 - B) Ribose
 - C) Lipids
 - D) Fats
 - E) Glycogen

48. This type of triglyceride contains more than one double bond in the fatty acid carbon atoms.
- A) Saturated
 - B) Monounsaturated
 - C) Polyunsaturated
 - D) Acylglycerols
 - E) Lipoprotein
49. This type of lipid is the body's long term energy storage molecule.
- A) Steroid
 - B) Phospholipid
 - C) Cholesterol
 - D) Triglyceride
 - E) Lipoprotein
50. This type of lipid is used by the body to create hormones.
- A) Cellulose
 - B) Phospholipid
 - C) Cholesterol
 - D) Triglyceride
 - E) Lipoprotein
51. Which of the following is NOT true about phospholipids?
- A) They contain an glycerol backbone
 - B) The head group is polar
 - C) The molecule is an important part of cell membranes
 - D) The tail groups are nonpolar
 - E) They are a major energy storage lipid
52. Which of the following is true about inorganic acids, bases and salts?
- A) An acid dissociates into one or more hydrogen ions and one or more anions.
 - B) A base dissociates in water into one or more hydroxide ions and one or more cations.
 - C) Salts dissociate into one or more anions and one or more cations, none of which are H^+ or OH^-
 - D) A and B only
 - E) All of the above

53. Prostaglandins and leukotrienes are considered:
- A) Amphipathic
 - B) Lipids
 - C) Eicosanoids
 - D) Lipids and eicosanoids
 - E) All of the above

54. The primary structure of a protein contains
- A) Alpha helix
 - B) Beta-pleated sheets
 - C) Substrates
 - D) Amino acids
 - E) All of the above

55. Which is the function of RNA?
- A) Produce electrical impulses
 - B) storage of energy
 - C) transfer information for protein synthesis
 - D) store information for protein synthesis
 - E) transport of fluids

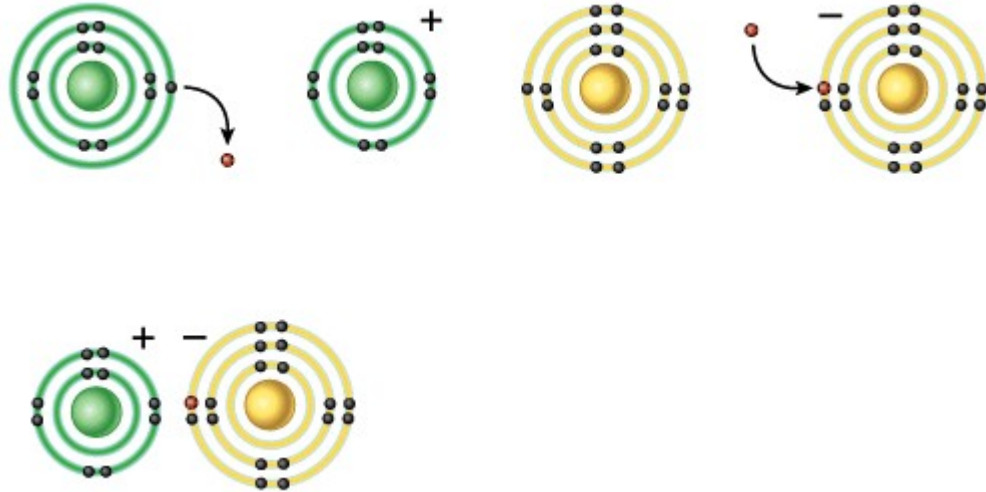
56. An atom with 4 electrons in its valence shell is:
- A) very stable
 - B) likely to ionize
 - C) a noble gas
 - D) able to form bonds to fill up its valence shell.
 - E) carbon

57. Which is the function of DNA?
- A) Produce chemical signals
 - B) storage of energy
 - C) transfer information for protein synthesis
 - D) store information for protein synthesis
 - E) transport of electrolytes

58. Which is the function of ATP?

- A) Produce electrical impulses
- B) Transfers energy for cell functions
- C) transfer information for protein synthesis
- D) store information for protein synthesis
- E) transport of fluids

59. What type of bond is illustrated by this image?



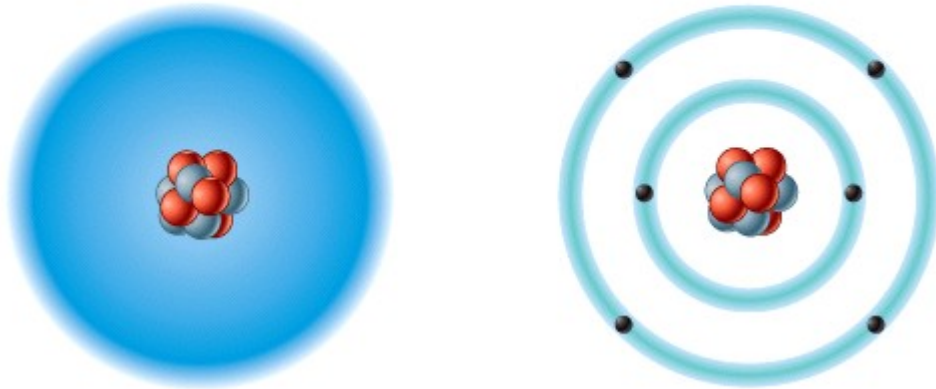
- A) Polar covalent
- B) Non polar covalent
- C) Hydrogen
- D) Peptide
- E) Ionic

60. What monomer is used to build RNA and DNA?

- A) fatty acid
- B) amino acid
- C) Glucose
- D) glycerol
- E) nucleotide

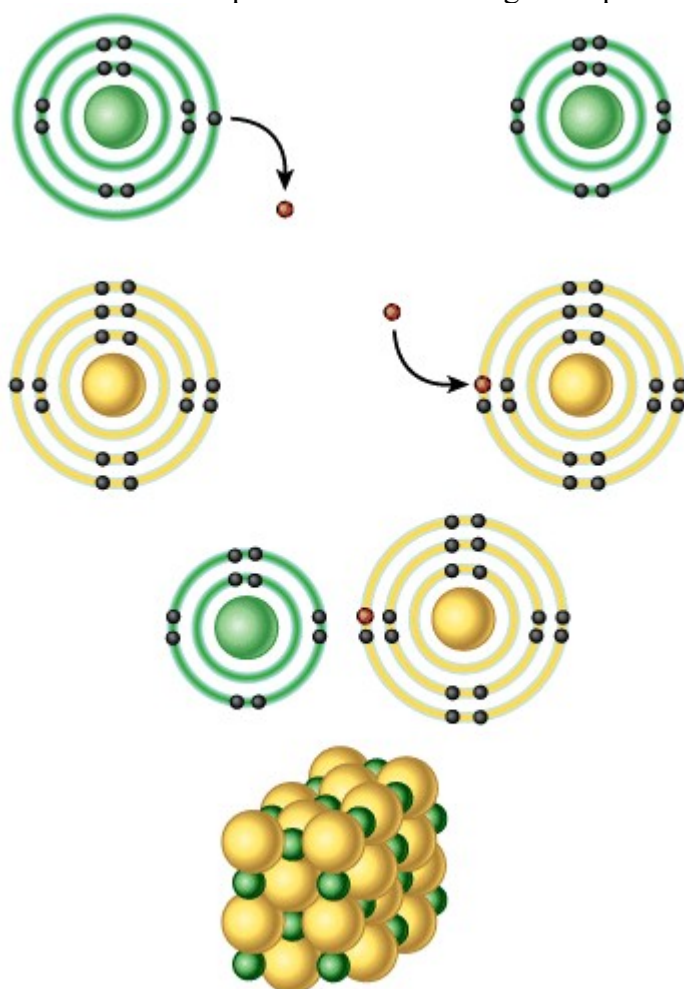
61. In the diagram which particles are negatively charged?

- A
● B
● C

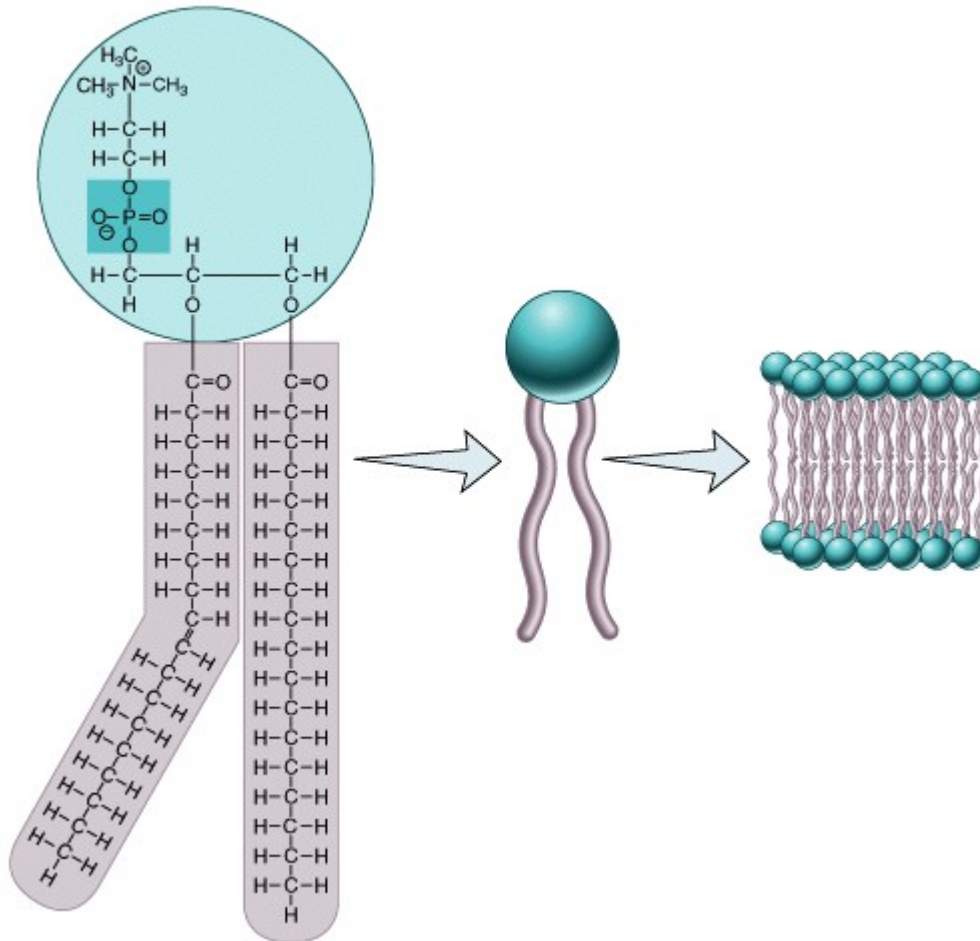


- A) A
B) B
C) C
D) All of the above
E) None of the above

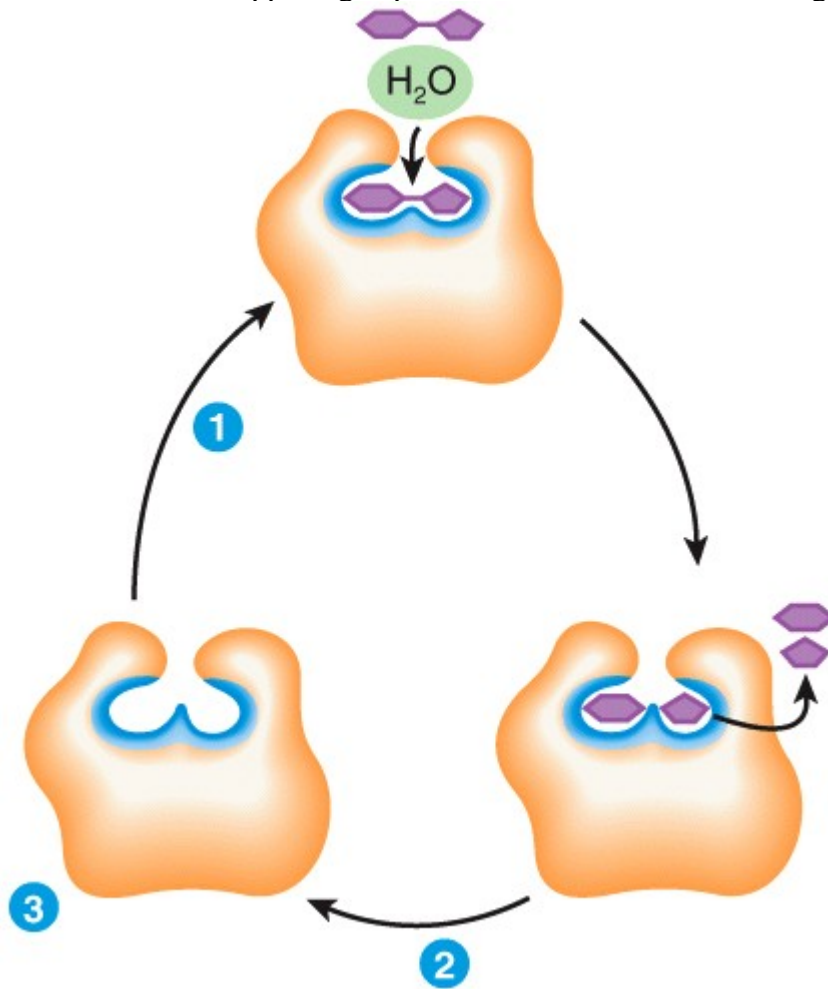
62. Give a brief description of what this diagram represents?



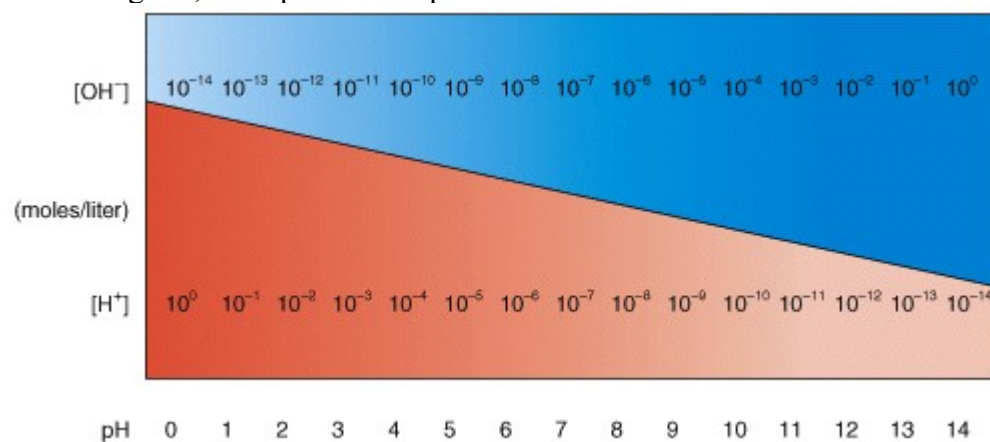
63. What is this molecule, where can it be found in a eukaryotic cell and what are the special properties of this molecule?



64. Describe what is happening at places 1, 2, and 3 in the following figure.

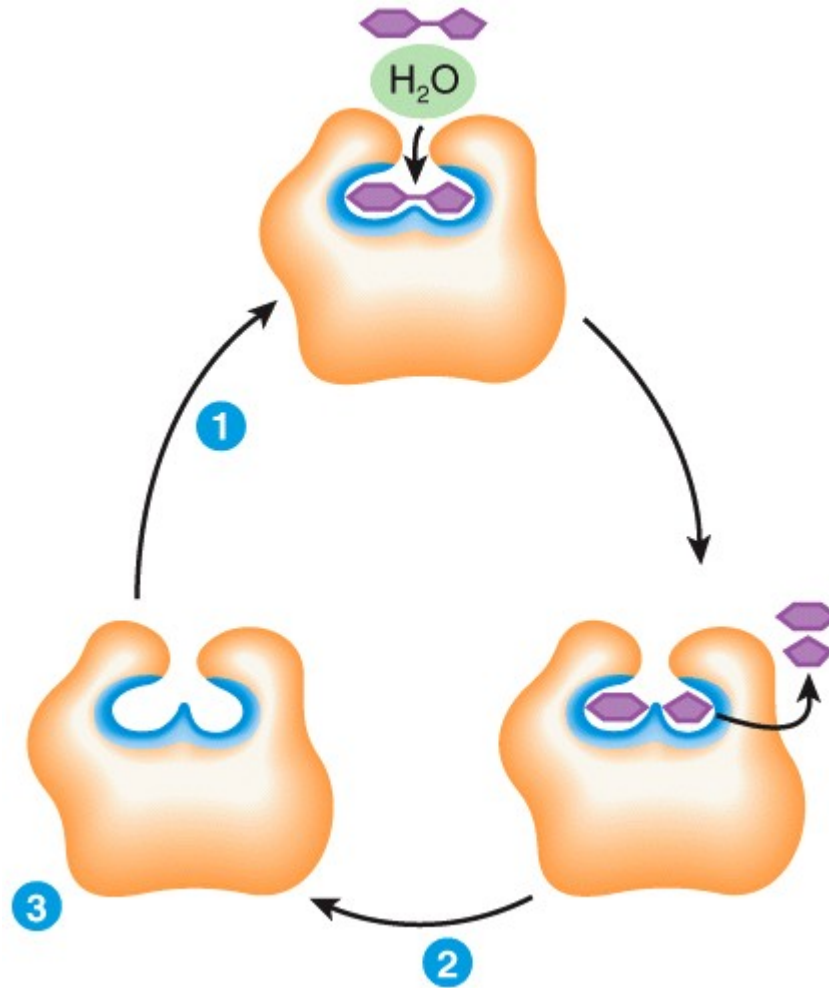


65. In the diagram, what pH value represents an acidic solution?



- A) 12
- B) 10
- C) 8
- D) 6
- E) None of the above

66. In the diagram, what would happen to the concentration of C if the concentration of A increases?



- A) Increases
- B) Decreases
- C) No change

67. What is the difference between atomic mass, mass number and atomic number?

68. Why are most lipids insoluble in water?

69. Describe the functions of water in the body.

70. Describe three factors that increase the rate of chemical reactions.

71. Describe the law of conservation of energy.
72. List the three major properties of enzymes.
73. Describe what happens to a protein's structure and function when it is denatured.
74. Describe what structures comprise an amino acid.
75. List the six major functions of proteins.
76. Describe a hydrogen bond.

Answer Key

1. D
2. C
3. E
4. B
5. D
6. A
7. B
8. A
9. A
10. C
11. A
12. E
13. B
14. B
15. E
16. B
17. B
18. C
19. B
20. A
21. D
22. D
23. B
24. B
25. D
26. C
27. B
28. D
29. D
30. A
31. B
32. C
33. D
34. E
35. B
36. B
37. A
38. B
39. A
40. D
41. D
42. C
43. E
44. A

- 45. D
- 46. A
- 47. E
- 48. C
- 49. D
- 50. C
- 51. E
- 52. E
- 53. D
- 54. D
- 55. C
- 56. E
- 57. D
- 58. B
- 59. E
- 60. E
- 61. C
- 62. This diagram represents the octet rule in chemical bonding. The octet rule states that two atoms will tend to bond if doing so means that they will both be left with eight electrons in their valence shells.
- 63. This is a phospholipid found in the plasma membranes of eukaryotic cells. It has a polar hydrophilic head group and a nonpolar hydrophobic tail group making it amphipathic.
- 64. This figure represents how an enzyme works. At number one, the enzyme and substrate come together at the active site of the enzyme forming the enzyme-substrate complex. At number two, the enzyme catalyzes the reaction and transforms the substrate into products. At number three, the reaction is complete and the enzyme remains unchanged and free to catalyze the same reaction again on a new substrate.
- 65. D
- 66. A
- 67. Atomic number is the number of protons found in the nucleus of an atom. Atomic mass is the total mass of all an atoms naturally occurring isotopes. Mass number is the total of a naturally occurring atoms protons and neutrons.
- 68. There are fewer polar covalent bonds due to a lower proportion of electronegative oxygen atoms in lipids. As a result, most lipids are hydrophobic.
- 69. Water is a solvent that allows transportation of solutes. Water acts in hydrolysis reactions to split reactants. Water can transport heat and, through sweating, releases heat from the body. Water is used as a lubricant, particularly in serous fluids.
- 70. Three factors that promote reaction rates are the presence of enzymes (catalysts), increased concentration of reactants and increased temperature.
- 71. Energy cannot be created or destroyed but it may be converted from one form to another form.
- 72. Enzymes are highly specific, efficient and subject to a variety of cellular controls.
- 73. The protein will become unraveled and lose its unique shape. Loss of that shape will destroy the protein's function.
- 74. Amino acids contain a central carbon atom, an amino group, an acidic carboxyl group and a side chain.

75. Proteins can be used for structure, regulation, contraction, immunology, transport and as a catalyst.
76. Hydrogen bonds form between the slightly positively charged hydrogen atom and a slightly negatively charged atom, mostly oxygen or nitrogen.