

Exam

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) Select the most correct statement regarding nucleic acids. 1) _____
- A) Three forms exist: DNA, RNA, and tDNA.
 - B) RNA is a long, single-stranded molecule made up of the bases A, T, G, and C.
 - C) tDNA is considered a molecular slave of DNA during protein synthesis.
 - D) DNA is a long, double-stranded molecule made up of A, T, G, and C bases.

Answer: D

Explanation: A)
B)
C)
D)

- 2) An atom with a valence of 3 may have a total of _____ electrons. 2) _____
- A) 13
 - B) 3
 - C) 17
 - D) 8

Answer: A

Explanation: A)
B)
C)
D)

- 3) Which of the following is not considered a factor in influencing a reaction rate? 3) _____
- A) temperature
 - B) time
 - C) concentration
 - D) particle size

Answer: B

Explanation: A)
B)
C)
D)

- 4) Which of the following does not describe uses for the ATP molecule? 4) _____
- A) pigment structure
 - B) transport across membranes
 - C) mechanical work
 - D) chemical work

Answer: A

Explanation: A)
B)
C)
D)

- 5) _____ is fat soluble, produced in the skin on exposure to UV radiation, and necessary for normal bone growth and function. 5) _____
- A) Vitamin A
 - B) Vitamin D
 - C) Vitamin K
 - D) Cortisol

Answer: B

Explanation: A)
B)
C)
D)

6) Stress proteins are a type of protein called _____. 6) _____
A) coenzymes B) eicosanoids C) cofactors D) chaperones

Answer: D
Explanation: A)
 B)
 C)
 D)

7) Which of the following is a neutralization reaction? 7) _____
A) $\text{NaOH} \rightarrow \text{Na}^+ + \text{OH}^-$ B) $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
C) $\text{HCl} \rightarrow \text{H}^+ + \text{Cl}^-$ D) $\text{NH}_3 + \text{H}^+ \rightarrow \text{NH}_4^+$

Answer: B
Explanation: A)
 B)
 C)
 D)

8) What is the ratio of fatty acids to glycerol in neutral fats? 8) _____
A) 3:1 B) 4:1 C) 2:1 D) 1:1

Answer: A
Explanation: A)
 B)
 C)
 D)

9) What is a chain of more than 50 amino acids called? 9) _____
A) polypeptide B) protein C) nucleic acid D) polysaccharide

Answer: B
Explanation: A)
 B)
 C)
 D)

10) Carbohydrates and proteins are built up from their basic building blocks by the _____. 10) _____
A) addition of a carbon atom between each two units
B) removal of a carbon atom between each two units
C) removal of a water molecule between each two units
D) addition of a water molecule between each two units

Answer: C
Explanation: A)
 B)
 C)
 D)

16) Select which reactions will usually be irreversible regarding chemical equilibrium in human bodies. 16) _____
A) $H_2O + CO_2$ to make H_2CO_3
B) ADP + Pi to make ATP
C) glucose molecules joined to make glycogen
D) glucose to CO_2 and H_2O

Answer: D

Explanation: A)
B)
C)
D)

17) Which property of water is demonstrated when we sweat? 17) _____
A) high heat of vaporization
B) polar solvent properties
C) high heat capacity
D) reactivity
E) cushioning

Answer: A

Explanation: A)
B)
C)
D)
E)

18) Which of the following is an example of a suspension? 18) _____
A) salt water B) rubbing alcohol C) blood D) cytoplasm

Answer: C

Explanation: A)
B)
C)
D)

19) The single most abundant protein in the body is _____. 19) _____
A) collagen B) glucose C) DNA D) hemoglobin

Answer: A

Explanation: A)
B)
C)
D)

20) Select the correct statement about isotopes. 20) _____
A) Isotopes occur only in the heavier elements.
B) All the isotopes of an element are radioactive.
C) Isotopes of the same element have the same atomic number but differ in their atomic masses.
D) All the isotopes of an element have the same number of neutrons but differing numbers of electrons.

Answer: C

Explanation: A)
B)
C)
D)

21) Which statement about enzymes is false? 21) _____
A) Enzymes require contact with substrate in order to assume their active form.
B) Enzymes may use coenzymes derived from vitamins or cofactors from metallic elements.
C) Enzymes may be damaged by high temperature.
D) Enzymes have the ability to accelerate reactions as much as a billion-fold.

Answer: A

Explanation: A)
B)
C)
D)

22) Which of the following statements is false? 22) _____
A) When the hydrogen ion concentration decreases, the hydroxyl ion concentration also decreases.
B) The pH of blood is slightly basic.
C) When acids and bases are mixed, they react with each other to form water and a salt.
D) The more hydrogen ions in a solution, the more acidic the solution.

Answer: A

Explanation: A)
B)
C)
D)

23) The basic structural material of the body consists of _____. 23) _____
A) Nucleic acids. B) Lipids. C) Carbohydrates D) Proteins.

Answer: D

Explanation: A)
B)
C)
D)

24) What is a dipole? 24) _____
A) an organic molecule B) a type of reaction
C) a polar molecule D) a type of bond

Answer: C
Explanation: A)
 B)
 C)
 D)

25) In a DNA molecule, the phosphate serves _____. 25) _____
A) to bind the sugars to their bases B) to hold the molecular backbone together
C) as nucleotides D) as a code

Answer: B
Explanation: A)
 B)
 C)
 D)

26) Which of the following is the major positive ion outside cells? 26) _____
A) potassium B) magnesium C) hydrogen D) sodium

Answer: D
Explanation: A)
 B)
 C)
 D)

27) Choose the answer that best describes HCO_3^- . 27) _____
A) a weak acid B) a bicarbonate ion
C) common in the liver D) a proton donor

Answer: B
Explanation: A)
 B)
 C)
 D)

28) In general, the lipids that we refer to as oils have _____. 28) _____
A) a high water content B) long fatty acid chains
C) a high degree of unsaturated bonds D) a high degree of saturated bonds

Answer: C
Explanation: A)
 B)
 C)
 D)

- 29) If atom X has an atomic number of 74 it would have which of the following? 29) _____
A) 37 electrons B) 37 protons and 37 neutrons
C) 74 protons D) 37 protons and 37 electrons

Answer: C

Explanation: A)
B)
C)
D)

- 30) Amino acids joining together to make a peptide is a good example of a(n) _____ reaction. 30) _____
A) decomposition B) reversible C) synthesis D) exchange

Answer: C

Explanation: A)
B)
C)
D)

- 31) Salts are always _____. 31) _____
A) hydrogen bonded B) ionic compounds
C) double covalent compounds D) single covalent compounds

Answer: B

Explanation: A)
B)
C)
D)

- 32) The four elements that make up about 96% of body matter are _____. 32) _____
A) carbon, oxygen, hydrogen, nitrogen B) nitrogen, hydrogen, calcium, sodium
C) sodium, potassium, hydrogen, oxygen D) carbon, oxygen, phosphorus, calcium

Answer: A

Explanation: A)
B)
C)
D)

- 33) The genetic information is coded in DNA by the _____. 33) _____
A) regular alteration of sugar and phosphate molecules
B) arrangement of the histones
C) three-dimensional structure of the double helix
D) sequence of the nucleotides

Answer: D

Explanation: A)
B)
C)
D)

34) A chemical reaction in which bonds are broken is usually associated with _____. 34) _____
A) a synthesis B) forming a larger molecule
C) the release of energy D) the consumption of energy

Answer: C

Explanation: A)
B)
C)
D)

35) Which bonds often bind different parts of a molecule into a specific three-dimensional shape? 35) _____
A) Oxygen B) Hydrogen C) Carbon D) Amino acid

Answer: B

Explanation: A)
B)
C)
D)

36) Sucrose is a _____. 36) _____
A) triglyceride B) disaccharide
C) polysaccharide D) monosaccharide

Answer: B

Explanation: A)
B)
C)
D)

37) Which of the following elements is necessary for proper conduction of nervous impulses? 37) _____
A) Na B) I C) Fe D) P

Answer: A

Explanation: A)
B)
C)
D)

38) What does CH₄ mean? 38) _____

- A) This was involved in a redox reaction.
- B) There is one carbon and four hydrogen atoms.
- C) There are four carbon and four hydrogen atoms.
- D) This is an inorganic molecule.

Answer: B

Explanation: A)
B)
C)
D)

43) 31) You notice that you cannot read your book through a test tube of patient fluid held against the print, making it so blurred as to be unreadable. There is no precipitant in the bottom of the beaker, though it has been sitting for several days in a rack. What type of liquid is this? 43) _____
A) suspension B) colloid C) mixture D) solution

Answer: B
Explanation: A)
 B)
 C)
 D)

44) Atom X has 17 protons. How many electrons are in its valence shell? 44) _____
A) 10 B) 5 C) 7 D) 3

Answer: C
Explanation: A)
 B)
 C)
 D)

45) What happens in redox reactions? 45) _____
A) the organic substance that loses hydrogen is usually reduced
B) the electron acceptor is oxidized
C) the reaction is uniformly reversible
D) both decomposition and electron exchange occur

Answer: D
Explanation: A)
 B)
 C)
 D)

46) Which of the following is not true of proteins? 46) _____
A) They have both functional and structural roles in the body..
B) They appear to be the molecular carriers of coded hereditary information.
C) Their function depends on their three-dimensional shape.
D) They may be denatured or coagulated by heat or acidity.

Answer: B
Explanation: A)
 B)
 C)
 D)

47) What level of protein synthesis is represented by the coiling of the protein chain backbone into an alpha helix? 47) _____
A) primary structure B) secondary structure
C) quaternary structure D) tertiary structure

Answer: B
Explanation: A)
 B)
 C)
 D)

48) Which of the following does NOT describe enzymes?

48) _____

- A) Some enzymes are purely protein.
- B) Each enzyme is chemically specific.
- C) Some enzymes are protein plus a cofactor.
- D) Enzymes work by raising the energy of activation.

Answer: D

Explanation: A)
B)
C)
D)

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

49) Name at least four things you know about enzymes.

49) _____

- Answer:
1. They are proteins.
 2. They have specific binding sites for specific substrates.
 3. They lower the activation barrier for a specific reaction.
 4. The names end in "ase."
 5. They can be denatured.
 6. They can be used again and again.

Explanation:

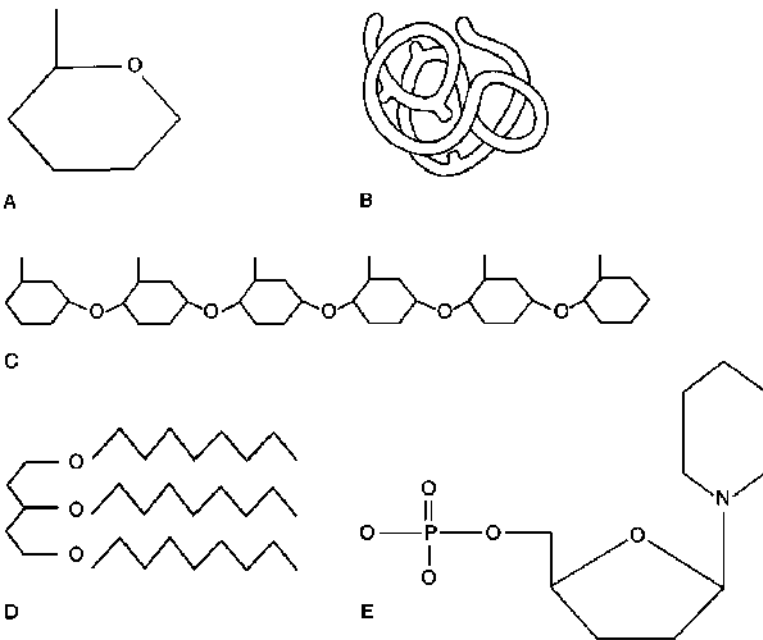


Figure 2.1

Using Figure 2.1, match the following:

50) Functional protein

50) _____

Answer: B
Explanation:

51) Which metals have a toxic effect on the body?

51) _____

Answer: heavy

Explanation:

52) A chemical bond never occurs between components of a mixture. Discuss this.

52) _____

Answer: Mixtures come in three forms—solutions, colloids, and suspensions. Components of these mixtures always retain their original makeup and can be separated into their individual components; therefore no chemical bonding has taken place.

Explanation:

53) Molecules such as methane that are made of atoms that share electrons have _____ bonds.

53) _____

Answer: covalent

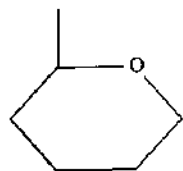
Explanation:

54) $AB \rightarrow A + B$ is an example of a(n) _____ reaction.

54) _____

Answer: decomposition

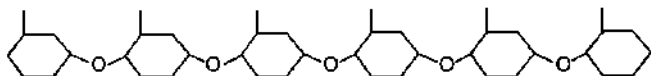
Explanation:



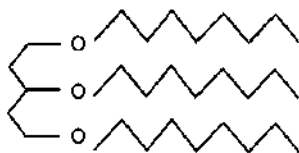
A



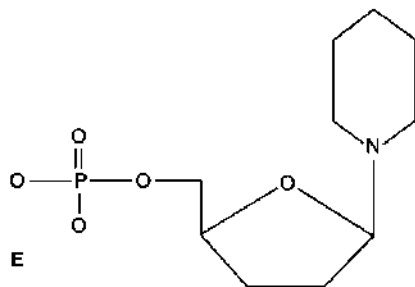
B



C



D



E

Figure 2.1

Using Figure 2.1, match the following:

55) Tertiary (protein) structure

55) _____

Answer: B

Explanation:

56) What type of chemical bond can form between an element with 11 protons and an element with 17 protons?

56) _____

Answer: ionic

Explanation:

57) What advantages does ATP have in being the energy currency molecule? 57) _____

Answer: Its energy is easy to capture and store; it releases just the right amount of energy for the cell's needs so it is protected from excessive energy release. A universal energy currency is efficient because a single system can be used by all the cells in the body.

Explanation:

58) What happens when globular proteins are denatured? 58) _____

Answer: The active sites are destroyed.

Explanation:

59) All chemical reactions are theoretically reversible. Comment on this statement. 59) _____

Answer: It is possible to reverse any reaction if the products are still present. Those that are only slightly exergonic are easily reversible. Some would require an enormous amount of energy to reverse. In the simple reaction $\text{Na} + \text{Cl} \rightarrow \text{NaCl}$ the amount of energy it takes to reverse table salt to chlorine gas and sodium metal is enormous. The reversing of the covalently bonded sugar molecule once it is reduced to ATP molecules is even harder or next to impossible without plant-like systems.

Explanation:

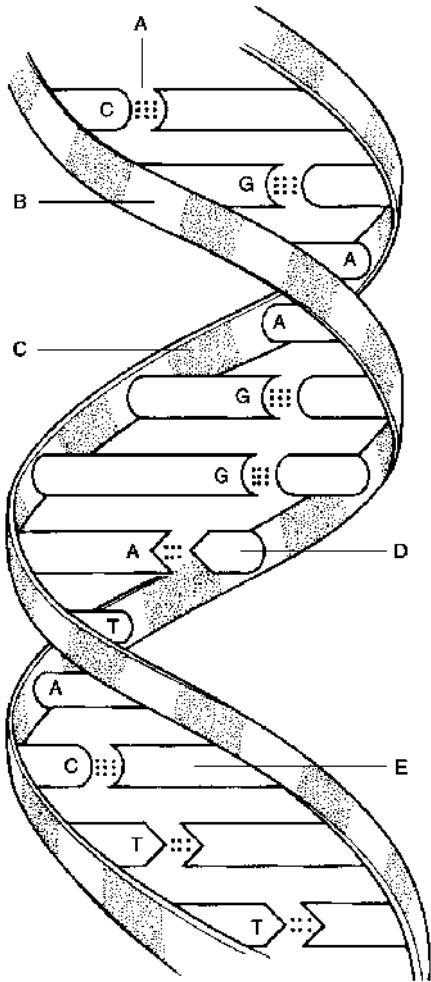


Figure 2.2

Using Figure 2.2, match the following:

60) Hydrogen bonds

60) _____

Answer: A

Explanation:

61) A holoenzyme is composed of an apoenzyme and a(n) _____.

61) _____

Answer: cofactor

Explanation:

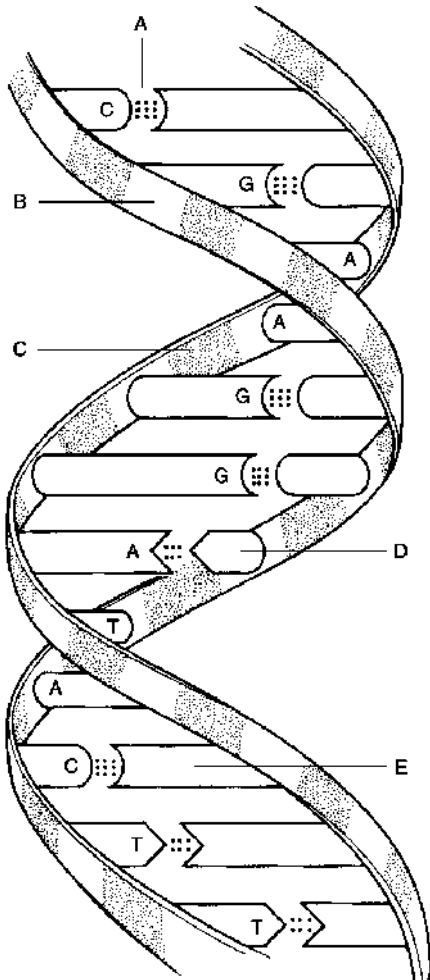


Figure 2.2

Using Figure 2.2, match the following:

62) Deoxyribose sugar.

62) _____

Answer: B

Explanation:

63) Describe the factors that affect chemical reaction rates.

63) _____

Answer: Temperature increases kinetic energy and therefore the force of molecular collisions. Particle size: smaller particles move faster at the same temperature and therefore collide more frequently; also, smaller particles have more surface area given the same concentration of reactants. Concentration: the higher the concentration, the greater the chance of particles colliding. Catalysts increase the rate of the reaction at a given temperature. Enzymes are biological catalysts.

Explanation:

64) Explain the difference between potential and kinetic energy.

64) _____

Answer: Potential energy is inactive stored energy that has potential to do work. Kinetic energy is energy in action.

Explanation:

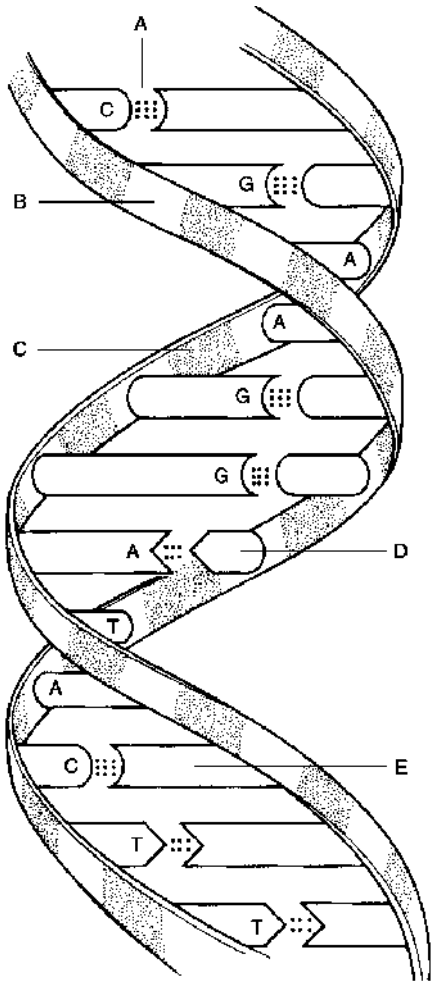


Figure 2.2

Using Figure 2.2, match the following:

65) Guanine

Answer: E

Explanation:

65) _____

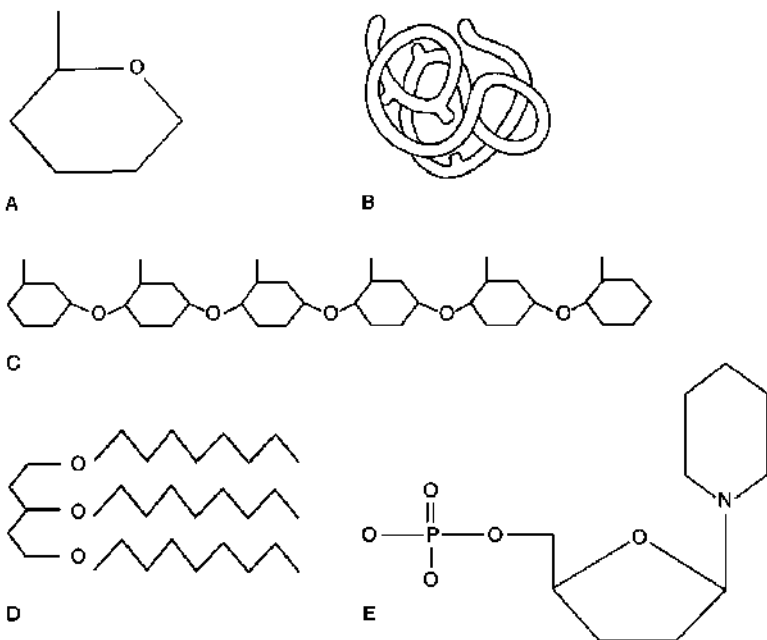


Figure 2.1

Using Figure 2.1, match the following:

- 66) Polymer 66) _____
 Answer: C
 Explanation:
- 67) How many phosphates would AMP have attached to it? 67) _____
 Answer: one
 Explanation:
- 68) In a DNA molecule, guanine would connect to _____. 68) _____
 Answer: cytosine
 Explanation:
- 69) An amino acid may act as a proton acceptor or donor. Explain. 69) _____
 Answer: Amino acids have two components—a base group (proton acceptor) and an organic acid part (a proton donor). Some have additional base or acid groups on the ends of their R groups as well.
 Explanation:
- 70) Protons and electrons exist in every atom nucleus except hydrogen. Is this statement true or false and why? 70) _____
 Answer: False. Hydrogen has one proton and one electron. It is the neutron, not the electron that can coexist in the nucleus and that hydrogen does not have.
 Explanation:
- 71) The atomic number is equal to the number of _____. 71) _____
 Answer: protons (and electrons)
 Explanation:

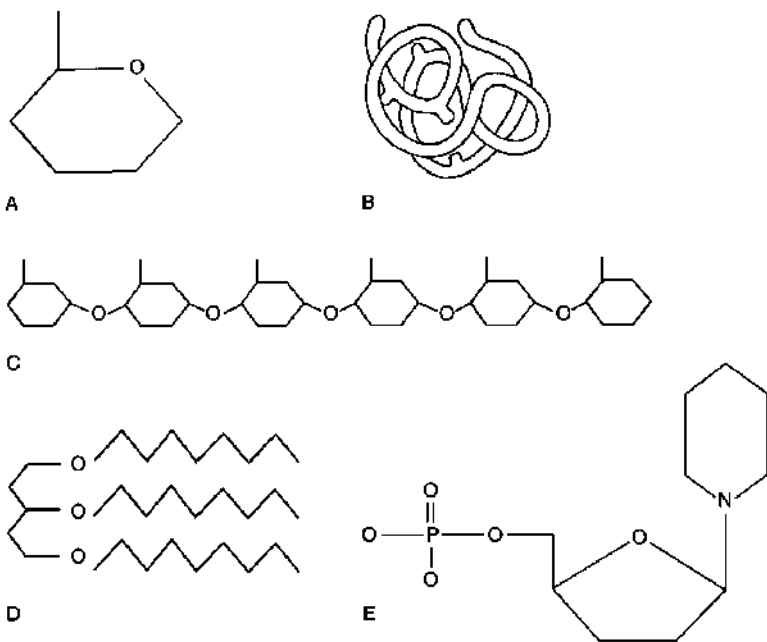


Figure 2.1

Using Figure 2.1, match the following:

72) Lipid

Answer: D
Explanation:

72) _____

73) Are all chemical reactions reversible? If not, why aren't they all reversible?

Answer: All chemical reactions are theoretically reversible, but only if the products are not consumed.
Explanation:

73) _____

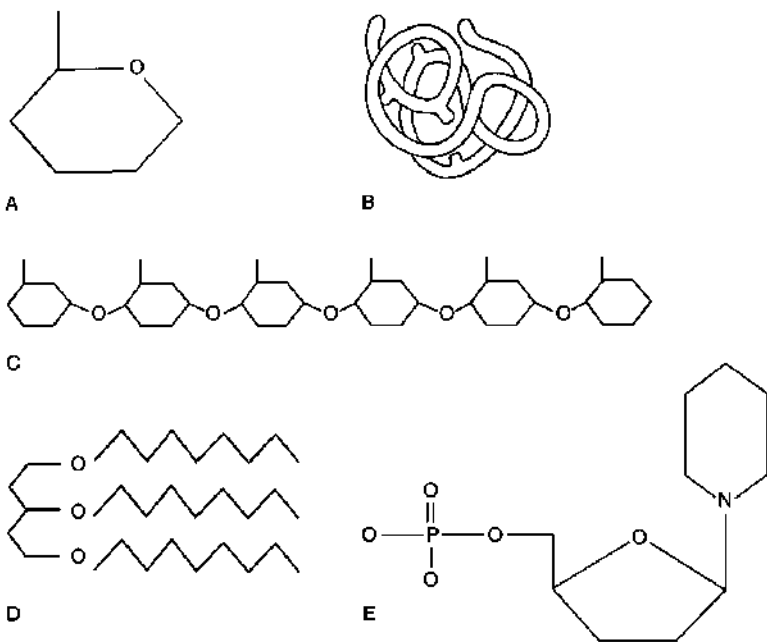


Figure 2.1

Using Figure 2.1, match the following:

74) Monosaccharide

Answer: A

Explanation:

74) _____

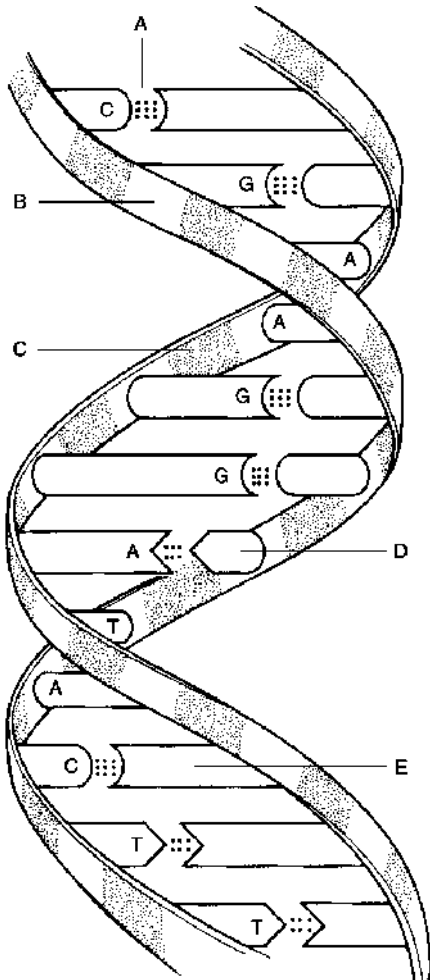


Figure 2.2

Using Figure 2.2, match the following:

75) Phosphate

Answer: C

Explanation:

75) _____

76) What properties does water have that make it a very versatile fluid?

Answer: High heat capacity, high heat of vaporization, polarity and solvent properties, reactivity, and cushioning.

Explanation:

76) _____

77) What does the polar end of a phospholipid contain?

Answer: a phosphorus-containing group

Explanation:

77) _____

- 78) If all protons, electrons, and neutrons are alike, regardless of the atom considered, what determines the unique properties of each element? 78) _____
Answer: Atoms of different elements are composed of different numbers of protons, electrons, and neutrons.
Explanation:
- 79) In the compound H_2CO_3 , what do the numbers 2 and 3 represent? 79) _____
Answer: The 2 indicates that there are two hydrogen atoms in the compound and the 3 indicates that there are three oxygen atoms in the compound.
Explanation:
- 80) Hydrogen bonds are more like a type of weak _____ than true bonds. 80) _____
Answer: attraction
Explanation:
- 81) How can phospholipids form a film when mixed in water? 81) _____
Answer: Phospholipids have both polar and nonpolar ends. The polar end interacts with water, leaving the nonpolar end oriented in the opposite direction.
Explanation:
- 82) The _____ molecule directly provides energy for cellular work. 82) _____
Answer: ATP
Explanation:
- 83) An atom with three electrons would have a valence of _____. 83) _____
Answer: one
Explanation:

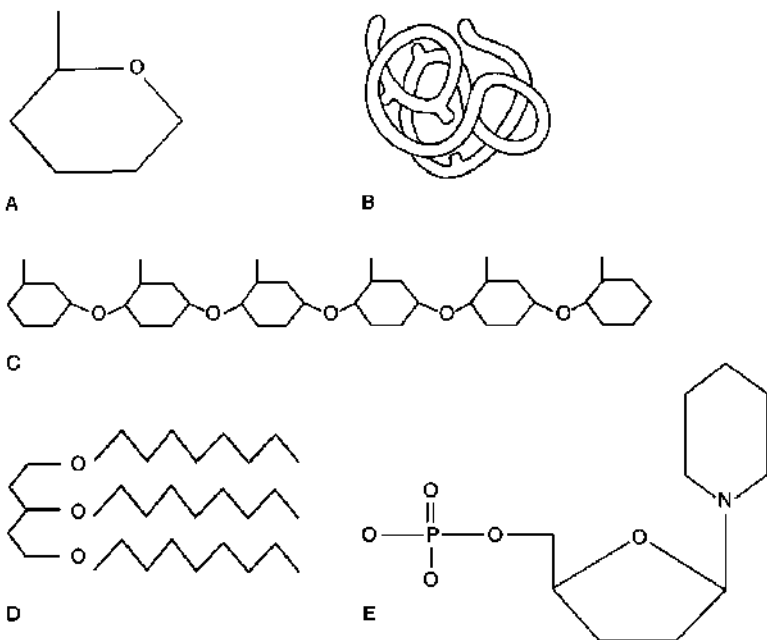


Figure 2.1

Using Figure 2.1, match the following:

- 84) Nucleotide 84) _____
 Answer: E
 Explanation:
- 85) Weak acids and bases make good _____. 85) _____
 Answer: buffers
 Explanation:
- 86) _____ have a bitter taste, feel slippery, and are proton acceptors. 86) _____
 Answer: Bases
 Explanation:
- 87) What is the major difference between polar and nonpolar covalent bonds? 87) _____
 Answer: Polar bonds have an unequal sharing of electrons resulting in a slight negative charge at one end of the molecule and a slight positive charge at the other end. Nonpolar bonds have an equal sharing of electrons, resulting in a balanced charge among the atoms.
 Explanation:
- 88) When a set of electrodes connected to a light bulb is placed in a solution of dextrose and a current is applied, the light bulb does not light up. When the same unit is placed in HCl, it does. Why? 88) _____
 Answer: HCl ionizes to form current-conducting electrolytes. Dextrose does not ionize, and therefore does not conduct current.
 Explanation:

89) Starch is the stored carbohydrate in plants, while _____ is the stored carbohydrate in animals.

89) _____

Answer: glycogen

Explanation:

90) Explain why chemical reactions in the body are often irreversible.

90) _____

Answer: Chemical reactions that release energy cannot be reversed unless energy is put back into the system. Also, some reactions produce molecules in excessive quantities (like CO₂ and NH₄) that the body then eliminates, but which are needed to reverse a reaction.

Explanation:

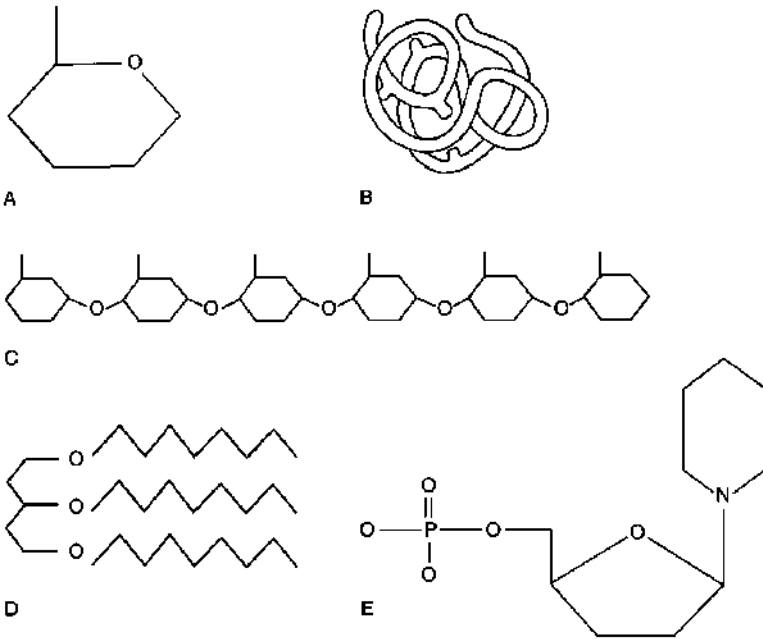


Figure 2.1

Using Figure 2.1, match the following:

91) Polysaccharide.

91) _____

Answer: C

Explanation:

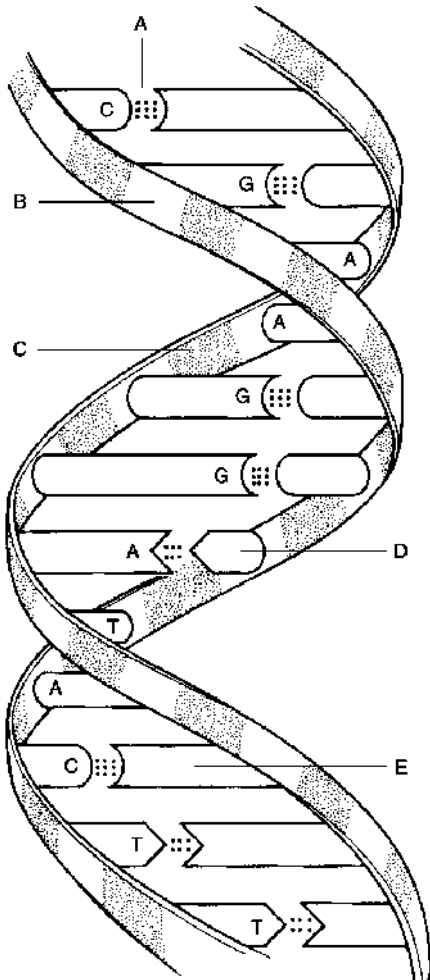


Figure 2.2

Using Figure 2.2, match the following:

92) Thymine
 Answer: D
 Explanation:

92) _____

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

93) Current information suggests that omega-3 fatty acids decrease the risk of heart disease.
 Answer: True False
 Explanation:

93) _____

94) Buffers resist abrupt and large changes in the pH of the body by releasing or binding ions.
 Answer: True False
 Explanation:

94) _____

95) Glucose is an example of a monosaccharide.
 Answer: True False
 Explanation:

95) _____

- 96) Isotopes differ from each other only in the number of electrons the atom contains. 96) _____
Answer: True False
Explanation:
- 97) Chemical properties are determined primarily by neutrons. 97) _____
Answer: True False
Explanation:
- 98) The fact that no chemical bonding occurs between the components of a mixture is the chief difference between mixtures and compounds. 98) _____
Answer: True False
Explanation:
- 99) All organic compounds contain carbon. 99) _____
Answer: True False
Explanation:
- 100) A chemical bond is an energy relationship between outer electrons and neighboring atoms. 100) _____
Answer: True False
Explanation:
- 101) Hydrogen bonds are too weak to bind atoms together to form molecules but are important intramolecular bonds. 101) _____
Answer: True False
Explanation:
- 102) The pH of body fluids must remain fairly constant for the body to maintain homeostasis. 102) _____
Answer: True False
Explanation:
- 103) A dipeptide can be broken into two amino acids by dehydration synthesis. 103) _____
Answer: True False
Explanation:
- 104) The atomic weight is only an average of relative weights of an atom and its isotopes, and it may vary from the weight of a specific isotope. 104) _____
Answer: True False
Explanation:
- 105) The acidity of a solution reflects the free hydrogen ions in the solution 105) _____
Answer: True False
Explanation:
- 106) Lipids are a poor source of stored energy. 106) _____
Answer: True False
Explanation:
- 107) Glycogen, the storage form of glucose, is primarily stored in muscle tissue only. 107) _____
Answer: True False
Explanation:

- 108) The lower the pH, the higher the hydrogen ion concentration. 108) _____
 Answer: True False
 Explanation:
- 109) Mixtures are combinations of elements or compounds that are physically blended together but are not bound by chemical bonds. 109) _____
 Answer: True False
 Explanation:
- 110) Covalent bonds are generally less stable than ionic bonds. 110) _____
 Answer: True False
 Explanation:
- 111) A charged particle is generally called an ion or electrolyte. 111) _____
 Answer: True False
 Explanation:
- 112) About 60% to 80% of the volume of most living cells consists of organic compounds. 112) _____
 Answer: True False
 Explanation:
- 113) It is the difference in the R group that makes each amino acid chemically unique. 113) _____
 Answer: True False
 Explanation:

MATCHING. Choose the item in column 2 that best matches each item in column 1.

Match the following:

- 114) Can be measured only by its effects on matter. A) Energy 114) _____
 Answer: A

Match the following:

- 115) Heterogeneous, will settle. A) Suspensions 115) _____
 Answer: A

Match the following chemical bonds to the correct description:

- 116) A bond in which electrons are completely lost or gained by the atoms involved. A) Ionic bond 116) _____
 Answer: A

Match the following:

- 117) Blood. A) Mixture 117) _____
 Answer: A

Match the following:

118) Heterogeneous, will not settle.

Answer: A

A) Colloids

118) _____

Match the following:

119) Number of protons in an atom

Answer: A

A) Atomic number

119) _____

Match the following:

120) Water.

Answer: A

A) Compound

120) _____

Match the following:

121) Anything that occupies space and has mass.

Answer: A

A) Matter

121) _____

Match the following:

122) Combined number of protons and neutrons in an atom

Answer: A

A) Mass number of an element

122) _____

Match the following:

123) Energy that travels in waves. Part of the electromagnetic spectrum.

Answer: A

A) Radiant energy

123) _____

Match the following chemical bonds to the correct description:

124) A bond in which electrons are shared unequally.

Answer: A

A) Polar covalent bond

124) _____

Match the following:

125) Is a function of, and varies with, gravity.

Answer: A

A) Weight

125) _____

Match the following:

126) Carbon.

Answer: A

A) Element

126) _____

Match the following particles to the correct description:

127) Smallest particle of an element that retains its properties.

Answer: A

A) Atom

127) _____

Match the following:

128) Dry ice (frozen carbon dioxide).

Answer: A

A) Compound

128) _____

Match the following chemical bonds to the correct description:

129) A type of bond important in tying different parts of the same molecule together into a three-dimensional structure.

Answer: A

A) Hydrogen bond

129) _____

Match the following particles to the correct description:

130) Electrically charged particle due to loss of an electron.

Answer: A

A) Cation

130) _____

Match the following:

131) Legs moving the pedals of a bicycle.

Answer: A

A) Mechanical energy

131) _____

Match the following:

132) Although a man who weighs 175 pounds on Earth would be lighter on the moon and heavier on Jupiter, his _____ would not be different.

Answer: A

A) Mass

132) _____

Match the following:

133) First one or two letters of an element's name

Answer: A

A) Atomic symbol

133) _____

Match the following particles to the correct description:

134) Neutral subatomic particle.

Answer: A

A) Neutron

134) _____

143) How can DNA be used to "fingerprint" a suspect in a crime?

Answer: The DNA of a person is unique to that individual. By obtaining the DNA from nucleated cells from the crime scene (e.g., tissue, sperm), enzymes may be used to break up the DNA into fragments. Because nearly everyone's DNA is different, it also breaks up into fragments differently. When the fragments are separated, they form patterns even more unique than fingerprint patterns. A match of suspect and crime scene DNA is strong evidence.

144) Although his cholesterol levels were not high, Mr. Martinez read that cholesterol was bad for his health, so he eliminated all foods and food products containing this molecule. He later found that his cholesterol level dropped only 20%. Why did it not drop more?

Answer: Cholesterol is produced by the liver, in addition to being ingested in foods.

145) Brenda is a 26-year-old female who is being discharged from the hospital after a vaginal delivery of an 8-pound healthy infant. Brenda is instructed by the nurse to eat a diet high in fiber and to drink 8 glasses of water per day to prevent constipation. Explain the role of fiber and water to promote defecation.

Answer: Cellulose is a polysaccharide found in all plant products that adds bulk to the diet to promote feces through the colon. Water acts as a lubricating liquid within the colon, which eases feces through the bowel.

146) A 23-year-old male was riding his road bike in 100-degree heat, when he suddenly became nauseated and weak. He called 911 from his cell phone. When the ambulance came, the paramedics started intravenous therapy for severe dehydration. Explain the critical role of water to maintain homeostasis.

Answer: Water is the most abundant and important inorganic compound in living material. It makes up 60% to 80% of the volume of most living cells. The properties of water are: high heat capacity, high heat of vaporization, polar solvent properties, reactivity, and cushioning. In this case the bicyclist lost a large amount of water through perspiration in an effort to cool his body. This caused a disruption in homeostasis.

147) Why is it possible for us to drink a solution that contains a mixture of equal concentration of a strong acid and a strong base, either of which, separately, would be very caustic?

Answer: When an acid and base of equal strength are mixed, they undergo a displacement reaction to form a water and a salt.

Answer Key
Testname: C2

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

Answer Key
Testname: C2

- 49)
 1. They are proteins.
 2. They have specific binding sites for specific substrates.
 3. They lower the activation barrier for a specific reaction.
 4. The names end in "ase."
 5. They can be denatured.
 6. They can be used again and again.
- 50) B
- 51) heavy
- 52) Mixtures come in three forms—solutions, colloids, and suspensions. Components of these mixtures always retain their original makeup and can be separated into their individual components; therefore no chemical bonding has taken place.
- 53) covalent
- 54) decomposition
- 55) B
- 56) ionic
- 57) Its energy is easy to capture and store; it releases just the right amount of energy for the cell's needs so it is protected from excessive energy release. A universal energy currency is efficient because a single system can be used by all the cells in the body.
- 58) The active sites are destroyed.
- 59) It is possible to reverse any reaction if the products are still present. Those that are only slightly exergonic are easily reversible. Some would require an enormous amount of energy to reverse. In the simple reaction $\text{Na} + \text{Cl} \rightarrow \text{NaCl}$ the amount of energy it takes to reverse table salt to chlorine gas and sodium metal is enormous. The reversing of the covalently bonded sugar molecule once it is reduced to ATP molecules is even harder or next to impossible without plant-like systems.
- 60) A
- 61) cofactor
- 62) B
- 63) Temperature increases kinetic energy and therefore the force of molecular collisions. Particle size: smaller particles move faster at the same temperature and therefore collide more frequently; also, smaller particles have more surface area given the same concentration of reactants. Concentration: the higher the concentration, the greater the chance of particles colliding. Catalysts increase the rate of the reaction at a given temperature. Enzymes are biological catalysts.
- 64) Potential energy is inactive stored energy that has potential to do work. Kinetic energy is energy in action.
- 65) E
- 66) C
- 67) one
- 68) cytosine
- 69) Amino acids have two components—a base group (proton acceptor) and an organic acid part (a proton donor). Some have additional base or acid groups on the ends of their R groups as well.
- 70) False. Hydrogen has one proton and one electron. It is the neutron, not the electron that can coexist in the nucleus and that hydrogen does not have.
- 71) protons (and electrons)
- 72) D
- 73) All chemical reactions are theoretically reversible, but only if the products are not consumed.
- 74) A
- 75) C
- 76) High heat capacity, high heat of vaporization, polarity and solvent properties, reactivity, and cushioning.
- 77) a phosphorus-containing group
- 78) Atoms of different elements are composed of different numbers of protons, electrons, and neutrons.
- 79) The 2 indicates that there are two hydrogen atoms in the compound and the 3 indicates that there are three oxygen atoms in the compound.

Answer Key
Testname: C2

- 80) attraction
- 81) Phospholipids have both polar and nonpolar ends. The polar end interacts with water, leaving the nonpolar end oriented in the opposite direction.
- 82) ATP
- 83) one
- 84) E
- 85) buffers
- 86) Bases
- 87) Polar bonds have an unequal sharing of electrons resulting in a slight negative charge at one end of the molecule and a slight positive charge at the other end. Nonpolar bonds have an equal sharing of electrons, resulting in a balanced charge among the atoms.
- 88) HCl ionizes to form current-conducting electrolytes. Dextrose does not ionize, and therefore does not conduct current.
- 89) glycogen
- 90) Chemical reactions that release energy cannot be reversed unless energy is put back into the system. Also, some reactions produce molecules in excessive quantities (like CO₂ and NH₄) that the body then eliminates, but which are needed to reverse a reaction.
- 91) C
- 92) D
- 93) TRUE
- 94) TRUE
- 95) TRUE
- 96) FALSE
- 97) FALSE
- 98) TRUE
- 99) TRUE
- 100) TRUE
- 101) TRUE
- 102) TRUE
- 103) FALSE
- 104) TRUE
- 105) TRUE
- 106) FALSE
- 107) FALSE
- 108) TRUE
- 109) TRUE
- 110) FALSE
- 111) TRUE
- 112) FALSE
- 113) TRUE
- 114) A
- 115) A
- 116) A
- 117) A
- 118) A
- 119) A
- 120) A
- 121) A
- 122) A
- 123) A
- 124) A

Answer Key
Testname: C2

- 125) A
- 126) A
- 127) A
- 128) A
- 129) A
- 130) A
- 131) A
- 132) A
- 133) A
- 134) A
- 135) A
- 136) A
- 137) A
- 138) A
- 139) A
- 140) A
- 141) Sodas are strong acids that can reduce bone and tooth salts. Calcium phosphate makes teeth hard and therefore more resistant to tooth decay.
- 142) You would expect a high pH. Taking antacids will neutralize the acidic stomach. Taking a "handful" of antacids can cause an alkaloid state. Certain drugs, such as corticosteroids and antacids that contain baking soda, will lead to metabolic alkalosis.
- 143) The DNA of a person is unique to that individual. By obtaining the DNA from nucleated cells from the crime scene (e.g., tissue, sperm), enzymes may be used to break up the DNA into fragments. Because nearly everyone's DNA is different, it also breaks up into fragments differently. When the fragments are separated, they form patterns even more unique than fingerprint patterns. A match of suspect and crime scene DNA is strong evidence.
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- 147) When an acid and base of equal strength are mixed, they undergo a displacement reaction to form a water and a salt.