

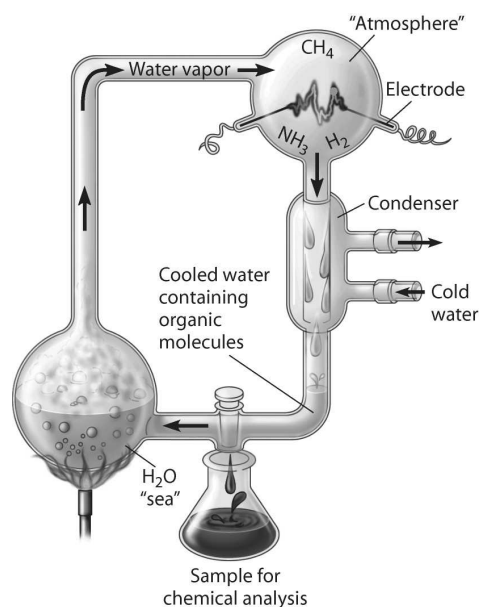
**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

1) The experimental approach taken in current biological investigations presumes that

- A) although a life force, or vitalism, exists in living organisms, this life force cannot be studied by physical or chemical methods.
- B) a life force ultimately controls the activities of living organisms and this life force cannot be studied by physical or chemical methods.
- C) living organisms can be understood in terms of the same physical and chemical laws that can be used to explain all natural phenomena.
- D) living organisms are composed of the same elements present in nonliving things, plus a few special trace elements found only in living organisms or their products.
- E) simple organic compounds can be synthesized in the laboratory from inorganic precursors, but complex organic compounds like carbohydrates and proteins can only be synthesized by living organisms.

2) Which of the following people used this apparatus to study formation of organic compounds?

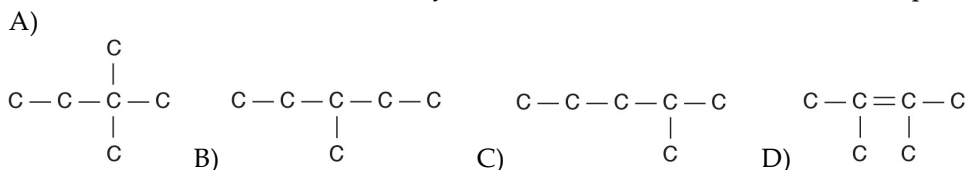
- A) Hermann Kolbe
- B) Stanley Miller
- C) Friedrich Wohler
- D) August Kekulé
- E) Jakob Berzelius



3) Research indicates that Ibuprofen, a drug used to relieve inflammation and pain, is a mixture of two enantiomers; that is, molecules that

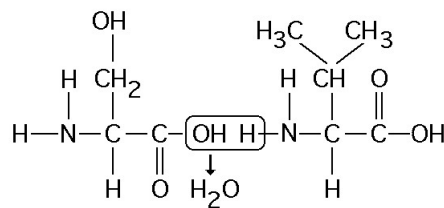
- A) differ in the location of their double bonds.
- B) lack an asymmetric carbon.
- C) are mirror images of one another.
- D) have identical three-dimensional shapes.
- E) differ in their electrical charge.

4) Three or four of the following illustrations depict different structural isomers of the organic compound with molecular formula  $C_6H_{14}$ . For clarity, only the carbon skeletons are shown; hydrogen atoms that would be attached to the carbons have been omitted. Which one, if any, is NOT a structural isomer of this compound?



E) Each of the illustrations in the other answer choices depicts a structural isomer of the compound with molecular formula  $C_6H_{14}$ .

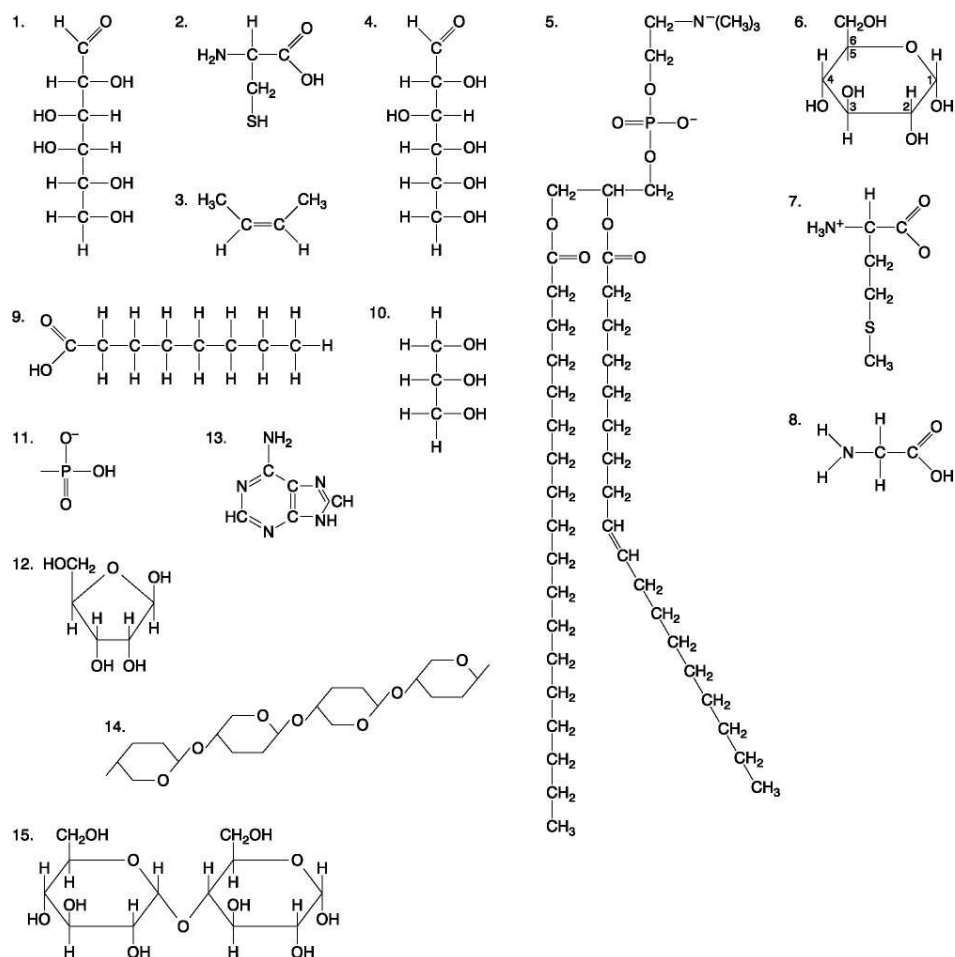
- 5) Which functional groups can act as acids?  
 A) carbonyl and carboxyl B) ketone and amino C) carboxyl and phosphate  
 D) amine and sulfhydryl E) hydroxyl and aldehyde
- 6) Testosterone and estradiol are  
 A) carbohydrates. B) proteins. C) nucleic acids. D) steroids. E) phospholipids.
- 7) Humans can digest starch but not cellulose because  
 A) humans have enzymes that can hydrolyze the beta ( $\beta$ ) glycosidic linkages of starch but not the alpha ( $\alpha$ ) glycosidic linkages of cellulose.  
 B) the monomer of starch is glucose, while the monomer of cellulose is galactose.  
 C) humans have enzymes that can hydrolyze the alpha ( $\alpha$ ) glycosidic linkages of starch but not the beta ( $\beta$ ) glycosidic linkages of cellulose.  
 D) the monomer of starch is glucose, while the monomer of cellulose is maltose.  
 E) humans harbor starch-digesting bacteria in the digestive tract.



**Figure 5.5**

- 8) Which of the following statements is/are true regarding the chemical reaction illustrated in Figure 5.5?  
 A) It joins two fatty acids together.  
 B) It results in a peptide bond.  
 C) It is a hydrolysis reaction.  
 D) A and B only  
 E) A, B, and C
- 9) The  $\alpha$  helix and the  $\beta$  pleated sheet are both common polypeptide forms found in which level of protein structure?  
 A) quaternary  
 B) primary  
 C) tertiary  
 D) secondary  
 E) all of the above
- 10) Which of the following *best* describes the flow of information in eukaryotic cells?  
 A) RNA  $\rightarrow$  proteins  $\rightarrow$  DNA  
 B) proteins  $\rightarrow$  DNA  $\rightarrow$  RNA  
 C) DNA  $\rightarrow$  proteins  $\rightarrow$  RNA  
 D) RNA  $\rightarrow$  DNA  $\rightarrow$  proteins  
 E) DNA  $\rightarrow$  RNA  $\rightarrow$  proteins

*The following questions are based on the 15 molecules illustrated in Figure 5.8. Each molecule may be used once, more than once, or not at all.*



**Figure 5.8**

- 11) Which molecule has hydrophilic and hydrophobic properties and would be found in plasma membranes?  
A) 14    B) 1    C) 6    D) 12    E) 5
- 12) Which of the following combinations could be linked together to form a nucleotide?  
A) 12, 14, and 15    B) 5, 9, and 10    C) 11, 12, and 13    D) 3, 7, and 8    E) 1, 2, and 11
- 13) Which of the following molecules contain(s) an aldehyde type of carbonyl functional group?  
A) 1    B) 10    C) 4    D) 1 and 4    E) 8
- 14) Which molecule is glycerol?  
A) 15    B) 1    C) 6    D) 10    E) 14
- 15) Which of the following molecules is a purine type of nitrogenous base?  
A) 5    B) 3    C) 13    D) 12    E) 2
- 16) Which of the following molecules act as building blocks (monomers) of polypeptides?  
A) 12, 13, and 15    B) 2, 7, and 8    C) 11, 12, and 13    D) 1, 4, and 6    E) 7, 8, and 13
- 17) Which of the following molecules is an amino acid with a hydrophobic R group or side chain?  
A) 7    B) 8    C) 3    D) 12
- 18) Which of the following molecules could be joined together by a peptide bond as a result of a dehydration reaction?  
A) 2 and 3    B) 7 and 8    C) 3 and 7    D) 12 and 13    E) 8 and 9

- 19) A fat (or triacylglycerol) would be formed as a result of a dehydration reaction between
- A) one molecule of 5 and three molecules of 10.
  - B) one molecule of 9 and three molecules of 10.
  - C) one molecule of 5 and three molecules of 9.
  - D) three molecules of 5 and one molecule of 9.
  - E) three molecules of 9 and one molecule of 10.
- 20) Which of the following molecules is the pentose sugar found in RNA?
- A) 4    B) 6    C) 12    D) 13    E) 1
- 21) Which of the following molecules contains a glycosidic linkage type of covalent bond?
- A) 13    B) 15    C) 6    D) 12    E) 4
- 22) Which of the following molecules has (have) a functional group that frequently is involved in maintaining the tertiary structure of a protein?
- A) 9 and 11    B) 3    C) 11    D) 9    E) 2
- 23) Which of the following statements is *false*?
- A) 14 and 15 could be joined together to form a polypeptide.
  - B) 1 and 4 could be joined together by a glycosidic linkage to form a disaccharide.
  - C) 9 and 10 could be joined together by ester bonds to form a triacylglycerol.
  - D) 2 and 7 could be joined together to form a short peptide.
  - E) 2, 7, and 8 could be joined together to form a short peptide.
- 24) In the fractionation of homogenized cells using centrifugation, the primary factor that determines whether a specific cellular component ends up in the supernatant or the pellet is
- A) the size and weight of the component.
  - B) the number of enzymes in the fraction.
  - C) the percentage of carbohydrates in the component.
  - D) the presence or absence of lipids in the component.
  - E) the relative solubility of the component.
- 25) Organelles other than the nucleus that contain DNA include
- A) ribosomes.    B) chloroplasts.    C) mitochondria.    D) B and C only    E) A, B, and C
- 26) A cell has the following molecules and structures: enzymes, DNA, ribosomes, plasma membrane, and mitochondria. It could be a cell from
- A) any kind of organism.    B) an animal, but not a plant.    C) a bacterium.
  - D) a plant, but not an animal.    E) a plant or an animal.
- 27) Why isn't the mitochondrion classified as part of the endomembrane system?
- A) It is not attached to the outer nuclear envelope.    B) Its structure is not derived from the ER.
  - C) It only has two membrane layers.    D) It is not involved in protein synthesis.    E) It has too many vesicles.
- 28) Cells can be described as having a cytoskeleton of internal structures that contribute to the shape, organization, and movement of the cell. Which of the following are part of the cytoskeleton?
- A) mitochondria    B) the nuclear envelope    C) microfilaments    D) lysosomes    E) nucleoli
- 29) Which of the following contain the 9 + 2 arrangement of microtubules?
- A) flagella    B) centrioles    C) cilia    D) A and C only    E) A, B, and C