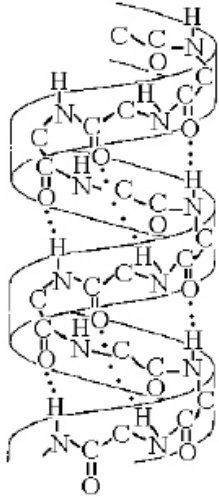


AP Biology Exam – Unit One

- Which of the following properties or processes do we associate with living things?
 - evolutionary adaptations
 - energy processing
 - responding to the environment
 - growth and reproduction
 - all of the above
- About 25 of the 92 natural elements are known to be essential to life. Which four of these 25 elements make up approximately 96% of living matter?
 - carbon, sodium, chlorine, nitrogen
 - carbon, sulfur, phosphorus, hydrogen
 - oxygen, hydrogen, calcium, sodium
 - carbon, hydrogen, nitrogen, oxygen
 - carbon, oxygen, sulfur, calcium
- A covalent chemical bond is one in which
 - electrons are removed from one atom and transferred to another atom so that the two atoms become oppositely charged.
 - protons and neutrons are shared by two atoms so as to satisfy the requirements of both atoms.
 - outer-shell electrons of two atoms are shared so as to satisfactorily fill the outer electron shells of both atoms.
 - outer-shell electrons of one atom are transferred to the inner electron shells of another atom.
 - the inner-shell electrons of one atom are transferred to the outer shell of another atom.
- Which of the following best describes chemical equilibrium?
 - Forward and reverse reactions continue with no effect on the concentrations of the reactants and products.
 - Concentrations of products are higher than the concentrations of the reactants.
 - Forward and reverse reactions have stopped so that the concentration of the reactants equals the concentration of the products.
 - Reactions stop only when all reactants have been converted to products.
 - There are equal concentrations of reactants and products, and the reactions have stopped.
- An example of a hydrogen bond is the bond between
 - C and H in methane (CH_4).
 - the H of one water molecule and the O of another water molecule.
 - Na^+ and Cl^- in salt.
 - the two hydrogen atoms in a molecule of hydrogen gas (H_2).
 - Mg^{2+} and Cl^- in MgCl_2 .
- Which of the following is possible due to the high surface tension of water?
 - Lakes don't freeze solid in winter, despite low temperatures.
 - A water strider can walk across the surface of a small pond.
 - Organisms resist temperature changes, although they give off heat due to chemical reactions.
 - Water can act as a solvent.
 - The pH of water remains exactly neutral.
- The formation of ice during colder weather helps moderate the seasonal transition to winter. This is mainly because
 - the breaking of hydrogen bonds absorbs heat.
 - the formation of hydrogen bonds releases heat.
 - the formation of hydrogen bonds absorbs heat.
 - there is greater evaporative cooling of lakes.
 - ice is denser than liquid water.

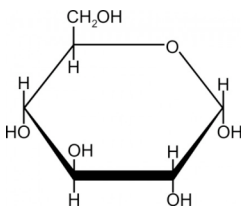
8. Recall that when sodium chloride (NaCl) is placed in water the component atoms of the NaCl crystal dissociate into individual sodium ions (Na^+) and chloride ions (Cl^-). In contrast, the atoms of covalently bonded molecules (e.g, glucose, sucrose, glycerol) do not generally dissociate when placed in aqueous solution. Which of the following solutions would be expected to contain the greatest concentration of particles (molecules or ions)?
- 0.5 M NaCl
 - 0.5 M glucose
 - 1.0 M NaCl
 - 1.0 M glucose
 - 1.0 M MgCl_2
9. Which of the following ionizes completely in solution and is considered to be a strong acid?
- NaOH
 - HCl
 - NH_3
 - H_2CO_3
 - CH_3COOH
10. What would be the pH of a solution with a hydroxide ion $[\text{OH}^-]$ concentration of 10^{-12} M?
- pH 2
 - pH 4
 - pH 10
 - pH 12
 - pH 14
11. Which of the following solutions has the greatest concentration of hydroxide ions $[\text{OH}^-]$?
- lemon juice at pH 2
 - vinegar at pH 3
 - tomato juice at pH 4
 - urine at pH 6
 - seawater at pH 8
12. If the pH of a solution is increased from pH 5 to pH 7, it means that the
- concentration of H^+ is 2 times greater than what it was at pH 5.
 - concentration of H^+ is 2 times less than what it was at pH 5.
 - concentration of OH^- is 100 times greater than what it was at pH 5.
 - concentration of OH^- is 100 times less than what it was at pH 5.
 - concentration of H^+ is 100 times greater and the concentration of OH^- is 100 times less than what they were at pH 5.
13. Which of the following contains nitrogen in addition to carbon, oxygen, and hydrogen?
- an alcohol such as ethanol
 - a monosaccharide such as glucose
 - a steroid such as testosterone
 - an amino acid such as glycine
 - a hydrocarbon such as benzene
14. Which of the following best summarizes the relationship between dehydration reactions and hydrolysis?
- Dehydration reactions assemble polymers, and hydrolysis breaks down polymers.
 - Hydrolysis only occurs in the urinary system, and dehydration reactions only occur in the digestive tract.
 - Dehydration reactions can occur only after hydrolysis.
 - Hydrolysis creates monomers, and dehydration reactions break down polymers.
 - A and C are correct.

15. The figure below shows the



- 1-4 linkage of the α glucose monomers of starch.
- 1-4 linkage of the β glucose monomers of cellulose.
- double helical structure of a DNA molecule.
- α helix secondary structure of a polypeptide.
- β pleated sheet secondary structure of a polypeptide.

16. If 128 molecules of the general type shown in the figure below were covalently joined together in sequence, the single molecule that would result would be a



- polysaccharide.
 - polypeptide.
 - polyunsaturated lipid.
 - monosaccharide.
 - disaccharide.
17. Which of the following is *true* of both starch and cellulose?
- They are both polymers of glucose.
 - They are geometric isomers of each other.
 - They can both be digested by humans.
 - They are both used for energy storage in plants.
 - They are both structural components of the plant cell wall.

18. The 20 different amino acids found in polypeptides exhibit different chemical and physical properties because of different
- carboxyl groups attached to an alpha (α) carbon
 - amino groups attached to an alpha (α) carbon
 - side chains (R groups).
 - alpha (α) carbons.
 - asymmetric carbons.
19. A strong covalent bond between amino acids that functions in maintaining a polypeptide's specific three-dimensional shape is a (an)
- ionic bond.
 - hydrophobic interaction.
 - van der Waals interaction.
 - disulfide bond.
 - hydrogen bond
20. At which level of protein structure are interactions between the side chains (R groups. *most* important?)
- primary
 - secondary
 - tertiary
 - quaternary
 - all of the above
21. The globular protein transthyretin results from the aggregation of four polypeptide subunits. Each of the subunits is a polypeptide chain with an α helix region. Which structure(s) must the transthyretin protein have?
- primary structure
 - primary and secondary structure
 - primary, secondary, and tertiary structure
 - primary, secondary, tertiary, and quaternary structure
 - primary, secondary, tertiary, quaternary, and alpha structure
22. Which of the following polysaccharides cannot be digested by man?
- | | |
|----------------|-------------|
| a. Amylopectin | c. Glycogen |
| b. Cellulose | d. Chitin |
| | e. Maltose |
23. All the chemical reactions that occur in a cell are called _____.
- homeostasis
 - adaptation
 - reproduction
 - metabolism
 - taxonomy
24. Of the following, ____ was not contained in the Miller-Urey original mixture.
- water
 - nitrogen
 - hydrogen
 - phosphorus

25. Which of the following gases is least likely to have existed in the early atmosphere of the earth?

- a. NH_3
- b. CO_2
- c. N_2
- d. H_2O
- e. O_2

26. Which of the following traits evolved last (i.e., most recently)?

- a. prokaryotic cells
- b. eukaryotic cells
- c. multicellularity
- d. photosynthesis
- e. heredity

27. Approximately what percentage of today's atmosphere is oxygen?

- a. 21%
- b. 73%
- c. 1%
- d. 50%
- e. 13%

28. What gas in today's atmosphere shields us from ultraviolet radiation?

- a. ozone
- b. nitrogen
- c. oxygen
- d. carbon dioxide
- e. carbon monoxide

29. Miller and Urey's experiments proved that

- a. life evolved on earth from inanimate chemicals
- b. coacervates were the first type of protocells
- c. complex organic molecules can form spontaneously under conditions that probably existed on the early earth
- d. RNA can act as an enzyme and assemble new RNA molecules from RNA templates
- e. bacteria were the first type of living organism to appear on the earth

30. What did Miller and Urey use as a source of energy in their experiments?

- a. actual lightning
- b. UV light
- c. an electrical spark
- d. radioactivity
- e. volcanoes

31. The early earth was a harsh environment and present day organisms that could possibly have survived that type of environment are

- a. eukaryotic organisms
- b. archeobacteria
- c. early plants called blue-green algae
- d. protobionts
- e. eubacteria

32. The endosymbiotic theory explains
- the origin of all organelles in eukaryotic cells
 - how bacterial cells can invade eukaryotic cells and cause disease
 - how mitochondria and chloroplasts originated from free-living cells
 - how eukaryotic cells consume food
 - none of the above
33. The first eukaryotes evolved on earth about _____ years ago.
- 1 million
 - 2.1 million
 - 1 billion
 - 2.1 billion
 - 3.6 billion
34. Buffers
- bind to excess H^+ ions that are added to a solution.
 - prevent large changes in body fluid pH.
 - may involve weak acids.
 - release H^+ ions when H^+ ion concentration in a solution falls.
 - all of these
35. The maintenance of proper pH of the body fluids is a result of:
- the operation of buffers in the blood
 - the control of respiratory ventilation
 - the active secretion of H^+ into filtrate by the kidney tubule cells
 - all of the above are correct.
36. A blood pH of 7.6 would indicate:
- | | |
|------------------------|--------------|
| a. nothing it's normal | c. alkalosis |
| b. acidosis | d. neutral |
37. The bicarbonate ion (HCO_3^-) is best described as a
- | | |
|----------------|-------------------|
| a. strong acid | c. weak acid |
| b. strong base | d. weak base |
| | e. conjugate base |
38. How is it possible for the rate and depth of breathing to affect hydrogen ion concentrations in body fluids?
- During increased air exchange, more oxygen is exchanged with body cells, binding hydrogen ions.
 - During increased air exchange, more carbon dioxide is given off, returning hydrogen ion concentrations to normal.
 - During increased respiration over the long term, more hemoglobin is produced, thus increasing the buffering of the blood
 - The rate and depth of breathing does not alter hydrogen ion concentration in body fluids.
39. The deficiency of iodine is a disorder commonly known as
- | | |
|---------------------|--------------------|
| a. Goiter | c. Phenylketonuria |
| b. Wilson's Disease | d. Chaga's Disease |
| | e. Scurvy |
40. Which of the following elements would be considered a trace element needed in the body?
- | | |
|-----------|----------------|
| a. Sulfur | c. Magnesium |
| b. Carbon | d. Phosphorous |
| | e. Hydrogen |

41. Trace elements are necessary due to their role in the body as
- a. Chelating factors
 - b. Coenzymes
 - c. Binding elements
 - d. Regulatory factors
 - e. Inhibitive enzymes
42. A prerequisite for the survival of life on land was the accumulation of
- a. O₂
 - b. CO₂
 - c. water vapor
 - d. O₃
 - e. soil bacteria
43. In animals, glucose is stored in the compound
- a. cellulose
 - b. amylose
 - c. glycogen
 - d. fructose
 - e. starch
44. You look at the label on a container of shortening and see “hydrogenated vegetable oil.” This means that during processing, the number of carbon-carbon double bonds was
- a. decreased
 - b. increased
 - c. unchanged
45. What would be the expected result of the treatment in the above question?
- a. The oil now has a lower melting point
 - b. The oil is now a solid at room temperature
 - c. There are more “kinks” in the fatty acid chain
 - d. The oil is now a derivative of a carbohydrate
 - e. The fatty acid is now a triglyceride
46. The primary structure of a protein is determined by
- a. disulfide bridges
 - b. sequence of amino acids
 - c. alpha helices
 - d. branching
 - e. hydrophobic interactions
47. Incorrect folding of a protein can have serious consequences. For example, a mistake in primary structure of a protein could result in a condition called
- a. Sickle Cell Disease
 - b. Phenylketonuria
 - c. Wilson’s Disease
 - d. Chron’s Disease
 - e. Scurvy
48. A molecule often spoken of as having a head and a tail is a(n)
- a. glucose
 - b. maltose
 - c. phospholipid
 - d. fat
 - e. phosphohexose
49. Sucrose, or table sugar, is a disaccharide made up of what two monosaccharides?
- a. glucose + glucose
 - b. glucose + fructose
 - c. fructose + fructose
 - d. Galactose + glucose
 - e. maltose + fructose
50. In a fat, three fatty acid chains attach to a(n) _____ molecule.
- a. phosphylcholine
 - b. monosaccharide
 - c. ester
 - d. PVA
 - e. glycerol