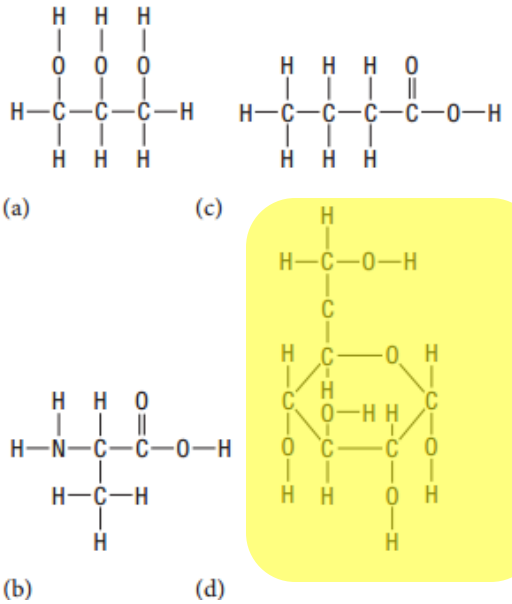
Biochemistry Sample Unit Test v1

Multiple Choice: [K]

2. Which of the following best describes a hydrolysis reaction? (1.1) K/U
   (a) a reaction in which small molecules react to produce a large polymer and water
   (b) a reaction between an acid and a base in which a salt (and often water) is produced
   (c) a reaction in which water molecules are split to degrade a large polymer
   (d) a reaction in which one of the reactants gains an electron

3. Molecules of water tend to stay close together, due to extensive hydrogen bonding. What is this property of water called? (1.2) K/U
   (a) surface tension
   (b) adhesion
   (c) cohesion
   (d) capillary action

7. Which diagram in **Figure 1** represents a building block of starch? (1.4) K/U



(a) (c) (b) (d)

17. Which organelle probably evolved in a similar way to chloroplasts? (2.2) K/U
   (a) lysosome
   (b) vesicle
   (c) mitochondrion
   (d) vacuole

11. Which statement about nucleotides is correct? (1.5) K/U
   (a) A nucleotide consists of three subunits linked together by covalent bonds.
   (b) A nucleotide consists of five subunits linked together by covalent bonds.
   (c) A nucleotide consists of three subunits linked together by ionic bonds.
   (d) A nucleotide consists of five subunits linked together by ionic bonds.

12. Which of the following are functions of proteins? (1.5) K/U
   (a) enzymatic activity, carrying genetic material, and transport
   (b) enzymatic activity, carrying genetic material, and cell recognition
   (c) enzymatic activity, transport, and cell recognition
   (d) carrying genetic material, transport, and cell recognition

13. Which statement best describes the process of competitive inhibition? (1.7) K/U
   (a) The products of the reaction block the active site of the enzyme.
   (b) The products of the reaction bind to a site other than the active site of the enzyme, but still block enzyme activity indirectly.
   (c) The substrate and cofactors compete for the active site.
   (d) The inhibitor binds to and directly blocks the active site of the enzyme.

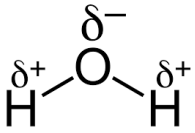
20. When a plant cell is placed in a hypotonic solution, what does the cell wall prevent from happening? (2.4) K/U
   (a) plasmolysis
   (b) diffusion
   (c) active transport
   (d) the cell from bursting

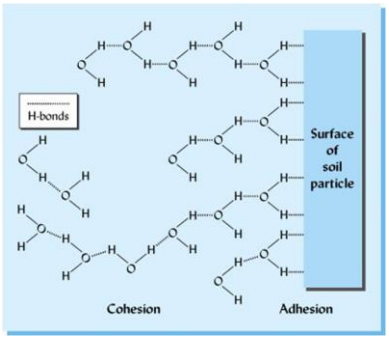
8. What is the difference between saturated fats and unsaturated fats? (1.4) K/U
   (a) Saturated fats are produced by plants, and unsaturated fats are produced by animals.
   (b) Saturated fats are produced by animals, and unsaturated fats are produced by plants.
   (c) Saturated fats contain glycerol, whereas unsaturated fats do not.
   (d) Margarine is a saturated fat, and butter is an unsaturated fat.

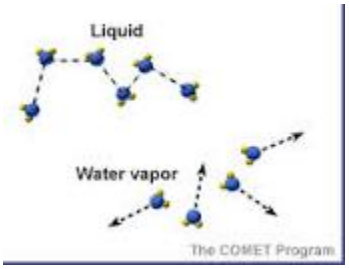
9. What is an amphipathic molecule? (1.4) K/U
   (a) primary lipid of a cell membrane
   (b) molecule that is composed of saturated fatty acids with single bonds in their carbon chain
   (c) molecule that contains both hydrophilic and hydrophobic regions
   (d) lipid that is composed of four carbon rings

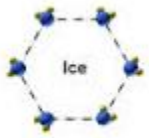
Short Answer - Communication

1. Draw and label a molecule of water and use this drawing to show 3 unique properties of water. [5 marks]





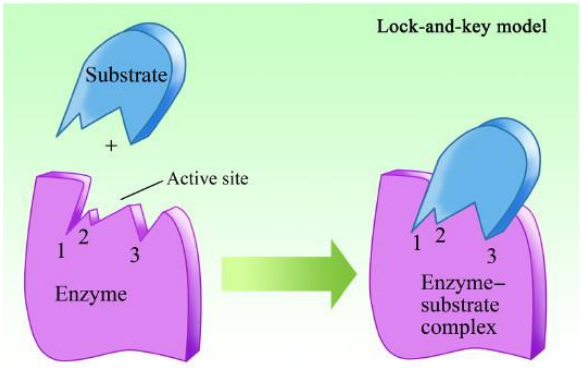




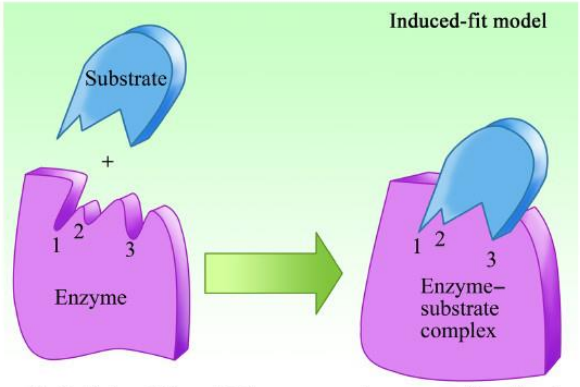
Solid less dense than liquid

High heat capacity: A lot of energy needed to break hydrogen bonds to go from liquid to gas

2. Use **diagrams** to help **compare & contrast** the Lock & Key model to the Induced Fit Model [3 marks] Label at least 4 relevant parts of the diagrams [2 marks]

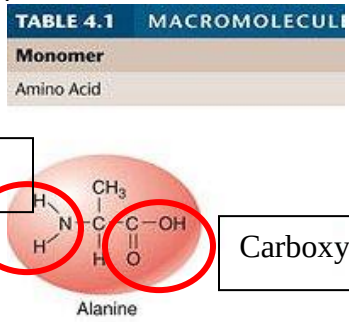


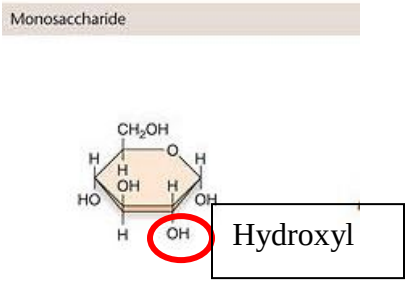
In the lock-and key model, the shape of the substrate and the confirmation of the active site are complementary to one another.

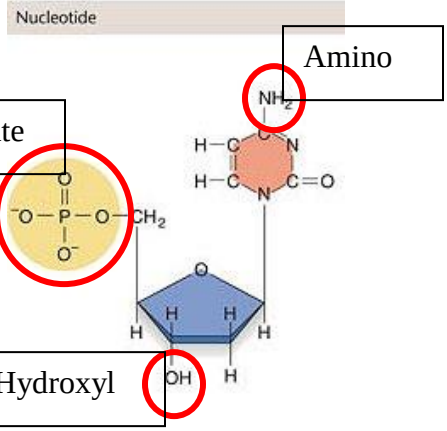


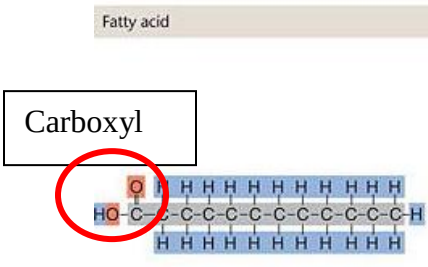
In the linduced-fit model, the enzyme undergoes a confirmational change upon binding to substrate. The shape of the active site becomes complementary to the shape of the substrate only after the substrate binds to the enzyme.

3. a) Draw and clearly **identify** 2 macromolecules. They cannot be from the same "family" of macromolecules. [1 mark **each**]
   b) Circle & label the functional groups in each macromolecule. [2 marks]









Short Answer – Thinking/Inquiry

4. Human organs and tissues used for transplants are cooled during transport. Use your understanding of enzymes to explain why this is done. [2 marks]

   -**They are cooled to preserve the enzymes and proteins within the tissues. If they are left at room temperature reactions would continue that would alter the environment surrounding the proteins, thus changing their structure (denaturing them) and ultimately altering their function. Since proteins folding depends on the environments this ensures the correct structure so when the transplant takes place the proteins still work in the new recipient.**

5. Relate the diversity in protein structure to the diversity in protein function. [2 marks]
   - **Structure dictates function**
   - **Proteins have 3-4 levels in the formation of their structure (not all have quaternary structures)**
   - **There are 20 monomers (amino acids) that proteins can used to build polymers. Each has a different side chains. These side chains interact to create a variety of structures.**
   - **Since the structures are so varied their functions are as well.**

Short Answer – Application

6. Gaucher's disease is when someone is missing the enzyme glucocerebrosidase. As a result they cannot break down the carbohydrate glucosylceramide. Why isn't this role performed by one of the many other digestive enzymes in the mouth, stomach or intestines that break down carbohydrates? [2 marks]

   - **Enzymes are substrate specific.**
   -**This means that glucosylceramide will only fit the active site on glucocerebrosidase and no other enzyme.**

7. Wax is applied to floors to protect the wood and prevent spills from soaking into the surface and creating stains by repelling the food/drink. Knowing that most foods and drinks contain primarily **water**, how do you think this product works? [2 marks]

   - **Waxes are non-polar making them hydrophobic which means they do not mix/dissolve with water or other polar substances.**
   -**Only like substances dissolve in like substances (ie polar in polar, and non-polar in non-polar) therefore wax would act like a barrier and repel the water and prevent it from soaking in the surface.**