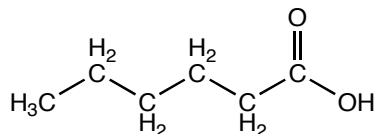
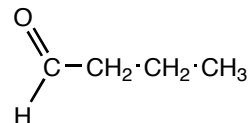


1. (8 pts.) Identify the functional groups in the following molecules

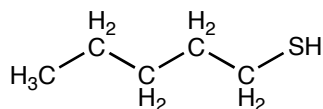
a.



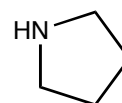
b.



c.



d.

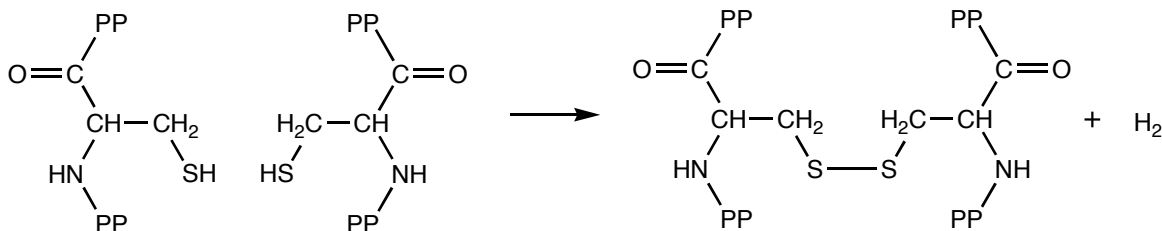


2. (13 pts.) List all of the intermolecular forces that would exist between a water molecule and each of the molecules listed in question 1. If hydrogen bonds form, indicate whether the molecule acts as an H-bond donor, acceptor, or both. Electronegativity of C = S = 2.5 and electronegativity of hydrogen = 2.1.

a.	b.
c.	d.

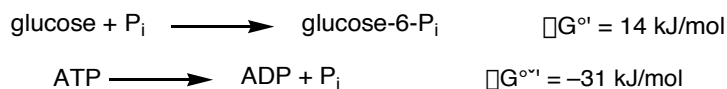
3. (6 pts.) When two cysteine residues react to form a disulfide bond, what kind of reaction is occurring?

(PP = the rest of the polypeptide)



4. (6 pts.) Fatty acids have two characteristic traits. Draw a fatty acid. It is not necessary to draw a specific fatty acid; instead, draw a molecule that contains both of the traits that make a fatty acid a fatty acid.

5. For the phosphorylation of glucose, $\Delta G^\circ = 14 \text{ kJ/mol}$. For the hydrolysis of ATP, $\Delta G^\circ = -31 \text{ kJ/mol}$.



a. (6 pts.) Based on ΔG° , is glucose expected to react with free phosphate, explain?

b. (8 pts.) If the source of the phosphate is ATP, is glucose-6-phosphate expected to form? Consider the overall reaction when explaining your answer.

6. (15 pts.) Draw the structure of and provide the three letter abbreviation for the following amino acids. Draw the amino acids as you would expect to find them at physiological pH.

a. serine	b. valine	c. lysine

7. a. (4 pts.) A reaction that has a $\Delta H < 0$ releases or absorbs energy?

b. (4 pts.) Can a reaction with a $\Delta H > 0$ be spontaneous, explain?

8. (10 pts.) Determine the primary structure of the hypothetical polypeptide that was broken down into the following pieces.

DNP-Arg was isolated from a total hydrolysis conducted after the polypeptide was reacted with 1-fluoro-2,4-dinitrobenzene.

Arginine was isolated from the carboxypeptidase catalyzed hydrolysis of the polypeptide.

Trypsin catalyzed hydrolysis

Chymotrypsin catalyzed hydrolysis

Phe-Ser-Pro-Phe-Arg

Arg-Pro-Pro-Ser-Lys-Phe

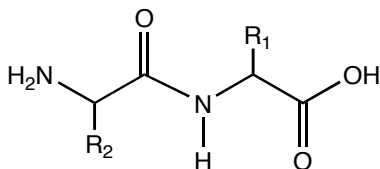
Arg

Arg

Pro-Pro-Ser-Lys

Ser-Pro-Phe

9. (10 pts.) A dipeptide is drawn below. Draw a resonance form and explain why rotation about the amide linkage is hindered.



10. (10 pts.) Two of the most common secondary structures found in polypeptides are formed by the interaction of atoms on the backbone of the polypeptide with atoms further along the backbone. A portion of a polypeptide is drawn below. By drawing another polypeptide indicate how the two portions of the backbone can interact with each other.

