Names: _____

Amino Acids & Structural Proteins

Physical-Chemical Properties of Egg Albumin

Reading: *http://chemconnections.org/general/chem106/Tech%20Prep/Protein%20Activity%20I-2016.html*

Experimental Procedure:

1. Add about 75 mL of water to a 150 mL beaker and heat it to at least 80.^{o}C. Carefully break one fresh egg into a second 150 mL beaker. Using an eye dropper, separate the egg white from the yolk and place it in a small beaker. Discard the yolk. Add a few drops of the egg white to the hot water after the temperature of the water has reached 80.^{o} C
2. Place one or two drops of egg white into a test tube or small beaker, which contains about 3 mL of 6 M HCI.
3. Place one or two drops of egg white into a test tube or small beaker, which contains about 3 mL of vinegar.
4. Place one or two drops of egg white into a test tube or small beaker, which contains a few grams of $NaHCO_3$ (baking soda) dissolved in 3-4 mL of water.
5. Place one or two drops of egg white into a test tube or small beaker, which contains a few grams of NaCl (table salt) dissolved in 3-4 mL of water.

		Observation
1.	Heating	
2.	HCl(aq) hydrochloric acid	
3.	CH_3COOH(aq) vinegar	
4.	$NaHCO_3$(aq) baking soda	
5.	NaCl(aq) salt solution	

Each of you in your group are to build a different amino acid using http://molview.org. Choose one of the following to build: alanine, glycine, serine, cysteine, or methionine. Entering the amino acid name in the molview search box will expedite the build, or assemble it by combining ammonia, methane and formic acid and modifying as necessary. From the Tools drop down menu, select Embed, copy and paste the embed code into an e-mail, send to Dr. R. who will place it in the course ChemWiki vocabulary page.

Post Lab Questions

1. How many chiral carbon atoms are there respectively in each of the amino acids that were built?

2. How many different amino acids are there in the following peptide segment that is found in albumin: GSIGAASMEF CFDVFKELKV ?

3. Name the amino acid residue that appears most frequently in the peptide segment.

4. What do you think happens in the reaction of egg white with the hydrochloric acid and with the hot water? Is there a difference between them? What might account for this?

5. Provide a reasonable explanation for the difference observed in treating the egg white with sodium chloride and with sodium bicarbonate.

6. Provide a plausible reason that would explain albumin reacting with hydrochloric acid but not vinegar (acetic acid)?

7. What is the mass of 0.10 moles of albumin? (Show calculation)

8. How many moles of egg white are there in one large AA grade egg? (Show calculation)

9. Briefly describe how to prepare a perfect soft boiled egg.

10. Provide a clear explanation in your own words of why copper and not stainless steel bowls have been used in recipes and in practice for over 200 years to froth egg whites.

11. Which of the experimental steps if done before Humpty's fall would have allowed all of the king's men to put Humpty back together? Briefly explain why.

12. There are many pharmaceutical drugs that are closely related to proteins or are proteins themselves. Based on what you explored in this activity, do you think that it would be possible to take these pharmaceuticals orally? Briefly explain your answer. (The drugs must enter your blood stream chemically intact in order to work pharmacologically.)