Name _____

Chem 352 - Spring 2011
Quiz 1

$R = 8.314\ J/(mol \bullet K) = 0.08206\ (L \bullet atm)/(mol \bullet K)$

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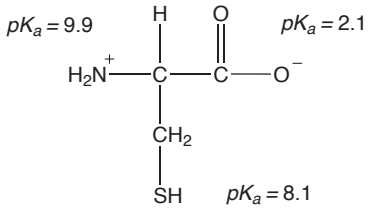
1. The structures of biological molecules and other cellular structures are determined in large part by non-covalent interactions between the molecules with themselves and with water.
   a. Name the interaction, and describe the underlying source of the force of the interaction, that directs such processes as lipid bilayer formation by phospholipids and the folding of polypeptides into globular proteins.

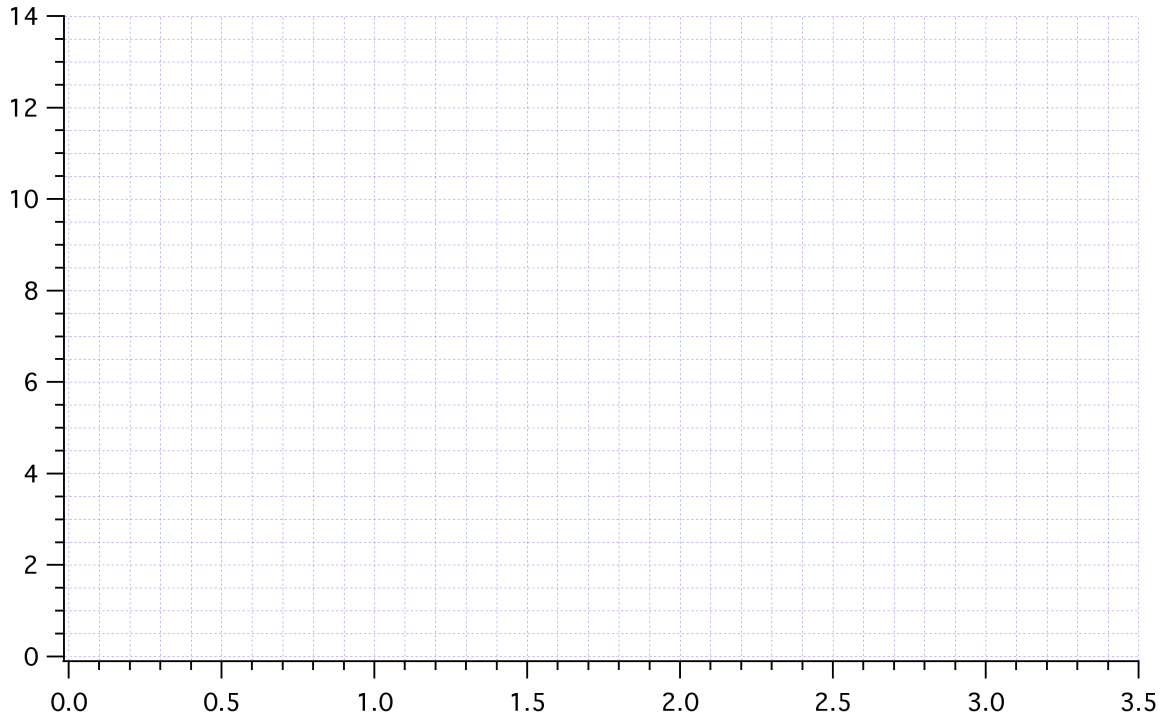
   b. Name the interaction and describe the underlying source of the force of the interaction that involves a sharing of a proton between two electronegative atoms

   c. Describe the underlying source of the force for the vander Waals interaction.

2. Cysteine is one of the 20 common amino acids and has a side chain with an acidic thiol group. The structure for cysteine in its partially protonated state is shown below along with the pK_a values for each of its titratable groups, as determined at 25°C:



a. Sketch the titration curve for a 20 mM solution of cysteine (Be sure to label the axes.):



b. Draw the predominant ionic species for cysteine that exists at *pH* 9. What is the *net charge* on this species?

Net charge = _____

c. Calculate the standard free energy change ($\Delta G°'$) in kJ/mol at 25°C for the dissociation of a proton from the *side chain thiol group* of cysteine?

$\Delta G°'$ = _____