Name _____

Chem 352 - Fall 2013
Quiz 2

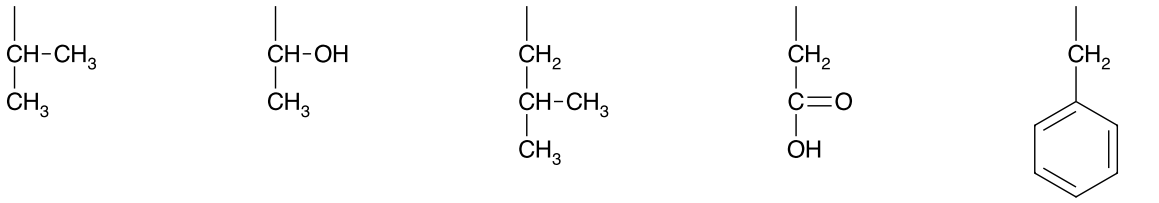
Potentially useful information:

pK_a values for ionizable groups in proteins: (*α-carboxyl*, 3.1; *α-amino*, 8.0; *Asp* & *Glu* side chains, 4.1; *His* side chain, 6.0; *Cys* side chain, 8.3; *Tyr* side chain, 10.9; *Lys* side chain, 10.8; *Arg* side chain, 12.5)

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

1. Using the three-letter codes, identify the amino acids that contain the side chains shown below:

A. _____ B._____ C. _____ D._____ E. _____



a. Which of these is aliphatic? (*Circle all that apply.*) A B C D E
b. Which of these can hydrogen bond to water? (*Circle all that apply.*) A B C D E
c. Which of these is aromatic? (*Circle all that apply.*) A B C D E
d. Which of these is charged at neutral *pH* values? (*Circle all that apply.*) A B C D E
e. Which of these is hydrophobic? (*Circle all that apply.*) A B C D E
f. Which of these is basic? (*Circle all that apply.*) A B C D E
g. Which of theses is acidic? (*Circle all that apply.*) A B C D E

2. Draw the chemical structure for the tripeptide Leu-Asp-Thr in its proper charged state at *pH* 7.

a. On your structure, label one example of a φ, a ψ and an ω bond.
b. On your structure, label one example of a *peptide bond*.

3. In class we discussed four hierarchical levels of structure in proteins.
   a. Describe the role that protein secondary structure plays in this hierarchy.

   b. Describe the link between a protein's primary structure, which is determined by the gene that encodes for it, and its tertiary structure. Include in your description the contribution that Christian Anfinsen made to our understanding of this link.

   c. The myoglobin molecule is homologous with each of the four subunits that make up a hemoglobin molecule.
      i. What does it mean to be *homologous*?

      ii. In comparing the functions of these two proteins, discuss how the presence of quaternary structure for hemoglobin makes it better suited to its function.