

## Practice Problems for Introduction and Review

- 1) Draw the structures of acetic acid, methanol, hexanoic acid, isocitrate and adenosine monophosphate. Label the hybridization of each carbon, oxygen and nitrogen, and indicate all bond angles.
- 2) Why does water make an upward facing (convex) meniscus at the top of a slightly overfilled container?
- 3) Explain why liquid water is more dense than ice. What would be a major global effect if the reverse were true?
- 4) Why do many salts dissolve in water, but not in cooking oil?
- 5) Diagram the functional groups on the 20 biological amino acids that can participate in hydrogen bonding (indicate whether the group would be a hydrogen bond donor or acceptor)?
- 6) Define hydrophobic and hydrophilic. Draw the structures of the 20 biological amino acids at pH 7.0 and state whether the SIDE CHAIN is most likely hydrophobic or hydrophilic.
- 7) Acetic acid has a pKa of 4.76. What are the molar concentrations of acetic acid ( $\text{CH}_3\text{COOH}$ ) and acetate ions ( $\text{CH}_3\text{COO}^-$ ) in a 0.250 M aqueous solution at pH 3.00, 4.00, 4.76, 5.25 and 6.00?
- 8) Which of the following buffers would be appropriate to maintain a pH of approximately 7.0? At what pH would each molecule be the best buffer?

acetic acid      ammonia      dihydrogen phosphate      TRIS      glycine