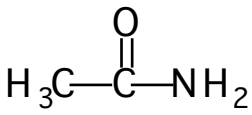
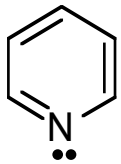
BMB-401 (Spring 2004)– Introductory Biochemistry
Problem Set 1

1. From your textbook (Lehninger) – Chap 4, problems 1, 2, 3, 5, 6, 9,

2. Draw the hydrogen bonding patterns that water can form with these two compounds. Play close attention to appropriate geometry.

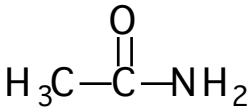


formamide



pyridine

2. Rationalize why the dielectric constant of the first compound in the following pairs of liquids is greater than the second.

a 

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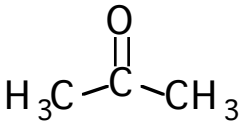

acetone

b CH_3OH
Methanol

CH_3CH_2OH
Ethanol

c $CHCl_3$
Chloroform

CCl_4
carbon tetrachloric

3. Calculate the pH of the following solutions. All solutions were prepared by adding the appropriate amount of acid or base to pure water.

a) 0.1 M HCl

b) 0.1 M NaOH

c) 0.1 M CH_3COOH

d) 3×10^{-5} M $HClO_4$

e) 2×10^{-8} M KOH

4. Calculate the formal concentrations of acetic acid and sodium acetate necessary to prepare a buffer solution of pH 5 that is 0.20 M in total acetate.

5. From the following information calculate the pH of the final solutions.

Buffer Species	Buffer Concentration	Initial pH	Amount of NaOH added
Imidazole	0.10 M	6.70	0.02 M
Imidazole	0.03 M	6.50	0.02 M
Phosphate	1.00 M	6.35	0.10 M