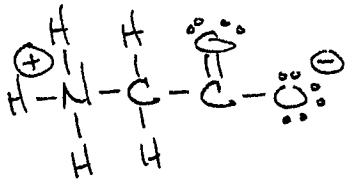
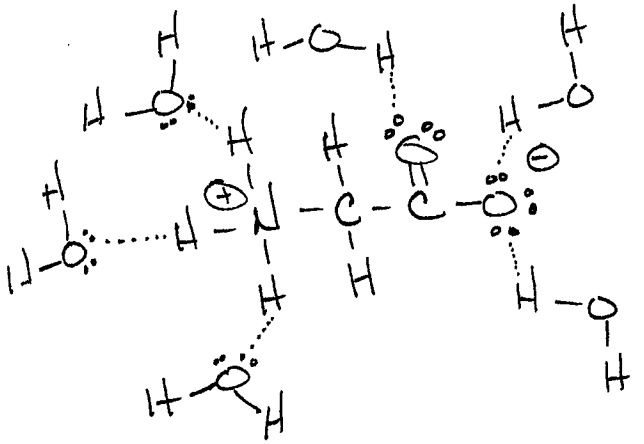
Chapter 8 Homework key

8.46 Glycine is a covalent compound that contains two charged atoms. Explain why glycine, an amino acid used to make proteins, is soluble in water.



glycine

⟹ We know that water is polar and has the ability to dissolve both polar and ionic compounds. Water can also hydrogen bond.



Oxygens can H-bond as well ~~as~~ as N-H bonds

The water molecules surround the ionic parts of the molecule similarly to the way they would with NaCl. In addition there is H-bonding between the glycine and water molecules.

8.56 Use the ~~solubility~~ Solubility rules listed ~~on~~ in Section 8.2B to predict whether each of the following ionic compounds is soluble in H_2O.

a. $Al(NO_3)_3$ $\Rightarrow$ NO_3^- always soluble $\Rightarrow$ Soluble

b. $NaHCO_3$ $\Rightarrow$ Na^+ always Soluble $\Rightarrow$ Soluble

c. $Cr(OH)_2$ $\Rightarrow$ OH^- usually insoluble $\Rightarrow$ insoluble

d. $Li{:}OH$ $\Rightarrow$ $Li{:}^+$ always Soluble $\Rightarrow$ Soluble

e. $CuCO_3$ $\Rightarrow$ CO_3^{2-} usually insoluble $\Rightarrow$ insoluble

f. $(NH_4)_2SO_4$ $\Rightarrow$ NH_4^+ always Soluble $\Rightarrow$ Soluble

g. $Fe(OH)_3$ $\Rightarrow$ OH^- usually insoluble $\Rightarrow$ insoluble

h. $(NH_4)_3PO_4$ $\Rightarrow$ NH_4^+ always Soluble $\Rightarrow$ Soluble

8.70 How many moles of solute are contained in each solution?

a. 250 mL of a 0.55 M $NaNO_3$ solution.

mL → L → moles

$$250\,mL \times \frac{1\,L}{1000\,mL} \times \frac{0.55\,moles\,NaNO_3}{1\,L} = 0.13\underset{\downarrow 5}{7}5\,moles\,NaNO_3$$

$$= \boxed{0.14\,moles\,NaNO_3}$$

b. 145 mL of a 4.0 M HNO_3 solution

mL → L → moles

$$145\,mL \times \frac{1\,L}{1000\,mL} \times \frac{4.0\,moles\,HNO_3}{1\,L} = \boxed{0.58\,moles\,HNO_3}$$

c. 6.5 L of a 2.5 M HCl solution

L → moles

$$6.5\,L \times \frac{2.5\,moles\,HCl}{1\,L} = 16\underset{\downarrow 2}{2}5\,moles\,HCl$$

$$= \boxed{16\,moles\,HCl}$$

8.118 A bottle of vodka labeled "80 proof" contains 40.% (v/v) ethanol in water. How many mL of ethanol are contained in 250 mL of vodka?

mL solution → mL ethanol

$$250 \text{ mL Vodka} \times \frac{40. \text{ mL ethanol}}{100 \text{ mL Vodka}} = 100 \text{ mL ethanol}$$

$$= \boxed{1.0 \times 10^2 \text{ mL ethanol}}$$