ANSWERS (page 640)

#36 "acid" + "base" → "water" + "salt"

#37B $HCl + Ca(OH)_2 \rightarrow HOH + CaCl_2$

#38 At the end point, two things happen:
1. the solution becomes neutral
2. the colored indicator changes color

#39A Since we have two volumes, start with a balanced reaction:

$NaOH + HCl \rightarrow HOH + NaCl$

fix any units:

28.0 mL is 0.028 L HCl

20.0 mL is 0.020 L NaOH

1.00 M is the same as $\frac{1.00 \text{ moles HCl}}{1 \text{ liter HCl}}$

now set up

$$\frac{0.0280 \text{ L HCl}}{0.0200 \text{ L NaOH}} \times \frac{1.00 \text{ mol HCl}}{1 \text{ L HCl}} \times \frac{1 \text{ mol NaOH}}{1 \text{ mol HCl}} = 1.4 \frac{\text{moles NaOH}}{\text{L NaOH}}$$

answer

#39B Balanced Reaction:

$$H_3PO_4 + 3NaOH \rightarrow 3H_2O + Na_3PO_4$$

Unit Conversion

START WITH THE KNOWN VOLUME OVER UNKNOWN VOLUME

$$\frac{0.0174 \text{ L } H_3PO_4}{0.0200 \text{ L NaOH}} \times \frac{1.0 \text{ mol } H_3PO_4}{1 \text{ L } H_3PO_4} \times \frac{3 \text{ mol NaOH}}{1 \text{ mol } H_3PO_4} \times \frac{\text{L NaOH}}{\text{mol NaOH}} = 2.61 \frac{\text{mol}}{\text{L NaO}}$$

45A BASE

45B ACID

45C BASE

47A SKIP $2Li + 2H_2O \rightarrow 2LiOH + H_2$

48A HNO_3, acid H_2O Base

48B CH_3COOH ACID H_2O Base

(page 609) 35, 36 39A 39B 40A 41B 41C
45 ABC 47A 48AB

#35 AUTO IONIZATION OF WATER IS

$$H_2O \rightleftarrows H^+ + OH^-$$

OR

$$H_2O + H_2O \rightleftarrows H_3O^+ + OH^-$$

36 $[H^+] = 1 \times 10^{-7}$ $[OH^-] = 1 \times 10^{-7}$ for water

39A $pH = -\log[H^+]$

$pH = 2.00$, acidic

39B $pH = 12.00$, basic

40A $1 \times 10^{-10} M$

40B ~~$1 \times 10^{-6} M$~~

41B 8.04

41C $6.3 \times 10^{-14} M$

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#45(A)

FIRST WRITE A BALANCED REACTION.

$$1H_2SO_4 + 2NaOH \rightarrow 2HOH + 1Na_2SO_4$$

THEN, SINCE YOU HAVE TWO VOLUMES WRITE KNOWN VOLUME OVER UNKNOWN VOLUME ON LEFTSIDE YOUR GOAL ON THE RIGHT SIDE SHOULD BE UNITS OF $\frac{mol\ H_2SO_4}{L\ H_2SO_4}$

$$\frac{0.015\ L\ NaOH}{0.025\ L\ H_2SO_4} \times \left(\quad\right) \times \left(\quad\right) = \frac{mol\ H_2SO_4}{L\ H_2SO_4}$$

NOW PUT IN THE CONERSION FACTORS AND SOLVE

$$\frac{0.015\ L\ NaOH}{0.025\ L\ H_2SO_4} \times \frac{0.100\ mol\ NaOH}{1\ L\ NaOH} \times \frac{1\ mol\ H_2SO_4}{2\ mol\ NaOH} = 0.030\ \frac{mol\ H_2SO_4}{L}$$