Chapter 16 Problem Stations **Name:** Key

Problem Station 1

a. $M = \frac{mol}{L}$

$L = 100\,mL \times \frac{1\,L}{1000\,mL} = 0.1\,L$

$mol = 19.7\,g\,NaHCO_3 \times \frac{1\,mol\,NaHCO_3}{84.01\,g\,NaHCO_3} = 0.234\,mol$

$M = \frac{0.234\,mol}{0.1} = \boxed{2.34\,M}$ 3 SF

b.

$M_1 = 2.34\,M$
$V_1 = ?$
$M_2 = 0.50\,M$
$V_2 = 200\,mL$ 2SF

$M_1V_1 = M_2V_2$

$V_1 = \frac{M_2V_2}{M_1}$

$V_1 = \frac{(0.5)(200)}{(2.34)} = \boxed{43\,mL}$ 2SF

Problem Station 2

$M_1 = 6.0\,M$
$V_1 = ?$
$M_2 = 1.5\,M$
$V_2 = 500\,mL$ 1 SF

$V_1 = \frac{M_2V_2}{M_1}$

$V_1 = \frac{(1.5)(500)}{(6.0)} = 125\,mL$

$500 - 125 = 375\,mL$

125 mL Acid
375 mL water

Problem Station 3

$M = \frac{mol}{L}$ so $mol = ML$

$mol = (0.150\,M)(2.30\,L) = 0.345\,mol$

$0.345\,mol\,KOH \times \frac{56.11\,g\,KOH}{1\,mol\,KOH} = \boxed{19.4\,g}$

Problem Station 4

$34.00\,g\ H_2SiF_6 \times \frac{1\,mol\ H_2SiF_6}{144.05\,g} = 0.236\,mol$

$M = \frac{mol}{L}$ so $L = \frac{mol}{M} = \frac{(.236\,mol)}{(0.70\,M)} = \boxed{0.34\,L}$

or 340 mL

Problem Station 5

$M_1 = 0.400\,M$

$V_1 = 25\,mL$

$M_2 = ?$

$V_2 = 25\,mL + 150\,mL = 175\,mL$

$M_1V_1 = M_2V_2$

so

$M_2 = \frac{M_1V_1}{V_2} = \frac{(0.400)(25)}{(175)}$

$M_2 = \boxed{0.057\,M}$

Problem Station 6

$M_1 = 1.6\,M$

$V_1 = ?$

$M_2 = 0.5\,M$

$V_2 = 200\,mL$

$M_1V_1 = M_2V_2$

so

$V_1 = \frac{M_2V_2}{M_1} = \frac{(0.5)(200)}{(1.6)} = \boxed{63\,mL}$

Problem Station 7

$M_1 = 3.0\ M$

$V_1 = x\ mL$

$M_2 = 0.2\ M$

$V_2 = 160 + x\ mL$

$M_1V_1 = M_2V_2$

$(3.0)(x) = (0.2)(160 + x)$

$3x = 32 + 0.2x$

$-0.2x \qquad -0.2x$

$\frac{2.8x}{2.8} = \frac{32}{2.8}$

$x = \boxed{11\ mL}$

Problem Station 8

$130 \times 5 = \boxed{650g}$

Problem Station 9

$100 - 60 = 40.$

60 g KBr would dissolve in the water, and 40 g KBr would sink to the bottom without dissolving. (Note: It would not form a supersaturated solution)

Problem Station 10

(a) 180g

(b) $180g - 120g = \boxed{60g}$