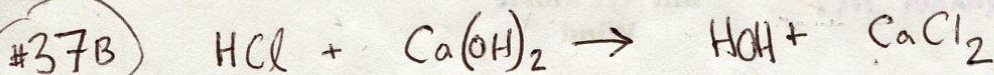


ANSWERS (page 640)

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

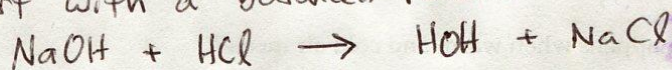


#38 At the end point, two things happen:

- ① the solution becomes neutral
- ② the colored indicator changes color

#39A

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



fix any units:

$$28.0 \text{ mL is } 0.028 \text{ L HCl}$$

$$20.0 \text{ mL is } 0.020 \text{ L NaOH}$$

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

now setup

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

answer

#39B

Balanced Reaction:



Unit Conversion

START WITH THE KNOWN VOLUME OVER UNKNOWN VOLUME

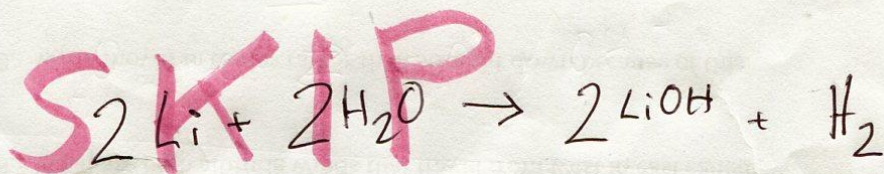
$$\frac{0.0174 \text{ L H}_3\text{PO}_4}{0.0200 \text{ L NaOH}} \times \frac{1.0 \text{ mol H}_3\text{PO}_4}{1 \text{ L H}_3\text{PO}_4} \times \frac{3 \text{ mol NaOH}}{1 \text{ mol H}_3\text{PO}_4} = 2.61 \frac{\text{mol NaOH}}{\text{L NaOH}}$$

(45)A BASE

(45)B ACID

(45)C BASE

(47)A



(48)A

HNO_3 , acid

H_2O Base

(48)B

CH_3COOH ACID

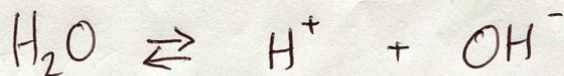
H_2O Base

(page 609)

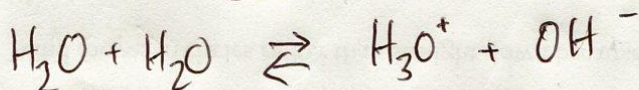
35, 36 39A 39B 40A 41B 41C
45 ABC 47A 48AB

#35

AUTO IONIZATION OF WATER IS



OR



36

$$[\text{H}^+] = 1 \times 10^{-7}$$

$$[\text{OH}^-] = 1 \times 10^{-7}$$

for water

39A

$$\text{pH} = -\log [\text{H}^+]$$

$$\text{pH} = 2.00, \text{ acidic}$$

39B

$$\text{pH} = 12.00, \text{ basic}$$

40A

$$1 \times 10^{-10} \text{ M}$$

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

41B

$$8.04$$

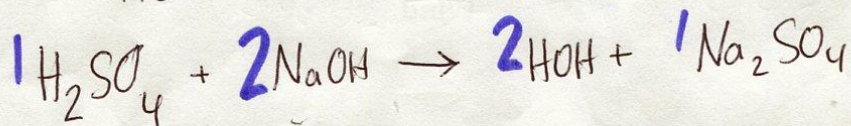
41C

$$6.3 \times 10^{-14} \text{ M}$$

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#45(A)

FIRST WRITE A BALANCED REACTION



THEN, SINCE YOU HAVE TWO VOLUMES WRITE KNOWN VOLUME OVER UNKNOWN VOLUME ON LEFTSIDE YOUR GOAL ON THE RIGHT SIDE SHOULD BE UNITS OF $\frac{\text{mol H}_2\text{SO}_4}{\text{L H}_2\text{SO}_4}$

$$\frac{0.015 \text{ L NaOH}}{0.025 \text{ L H}_2\text{SO}_4} \times \left(\frac{\quad}{\quad} \right) \times \left(\frac{\quad}{\quad} \right) = \frac{\text{mol H}_2\text{SO}_4}{\text{L H}_2\text{SO}_4}$$

NOW PUT IN THE CONVERSION FACTORS AND SOLVE

$$\frac{0.015 \text{ L NaOH}}{0.025 \text{ L H}_2\text{SO}_4} \times \frac{0.100 \text{ mol NaOH}}{1 \text{ L NaOH}} \times \frac{1 \text{ mol H}_2\text{SO}_4}{2 \text{ mol NaOH}} = 0.030 \frac{\text{mol H}_2\text{SO}_4}{\text{L}}$$