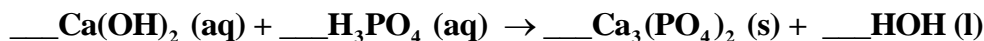


Chemistry
Mr. MacGillivray
Solution Stoichiometry Worksheet

1. PROBLEM: What volume of 0.250 M phosphoric acid (H_3PO_4) is required to neutralize 35.2 ml of 0.338 M calcium hydroxide, $\text{Ca}(\text{OH})_2$?

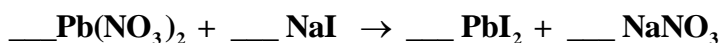


$\text{Ca}(\text{OH})_2$		H_3PO_4
	V	
	M	
	n	

- a. Balance the equation above.
- b. Fill in the blanks to set up your knowns and unknowns.

- c. Find the number of moles of calcium hydroxide. Use $M=n/V$. Show calculations. Units have to cancel, so use liters! Fill in the answer in the "mol" ("n") box under $\text{Ca}(\text{OH})_2$.
- d. Convert from mol of calcium hydroxide to moles of phosphoric acid. Show your calculations. Fill in the answer above in the "mol" box under phosphoric acid.
- e. Use $M=n/V$ to find the number of liters of H_3PO_4 . Convert to ml and fill in the answer ☺!

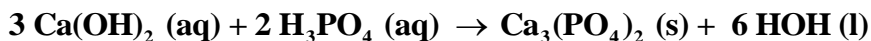
2. Repeat the above procedure for the following problem: How many ml of a 0.312 M solution of $\text{Pb}(\text{NO}_3)_2$ are needed to react completely with 75.0 ml of 0.500 M NaI ?



ANSWERS

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1. PROBLEM: What volume of 0.250 M phosphoric acid (H₃PO₄) is required to neutralize 35.2 ml of 0.338 M calcium hydroxide, Ca(OH)₂?



35.2 ml	V	31.7 ml
0.338 M	M	0.250 M
0.0119 moles	n	0.00793 moles

- a. Balance the equation above.
- b. Fill in the blanks to set up your knowns and unknowns.

- c. Find the number of moles of calcium hydroxide. Use $M=n/V$. Show calculations. Units have to cancel, so use liters! Fill in the answer in the "mol" ("n") box under Ca(OH)₂.

$$M = \frac{n}{V} \quad n = (0.338 \frac{\text{moles}}{\text{L}})(0.0352 \text{ L}) = 0.0118976 \text{ moles Ca(OH)}_2$$

- d. Convert from mol of calcium hydroxide to moles of phosphoric acid. Show your calculations. Fill in the answer above in the "mol" box under phosphoric acid.

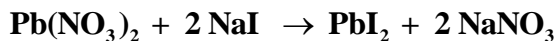
$$0.0119 \text{ moles Ca(OH)}_2 \times \frac{2 \text{ moles H}_3\text{PO}_4}{3 \text{ moles Ca(OH)}_2} = 0.00793 \text{ moles H}_3\text{PO}_4$$

- e. Use $M=n/V$ to find the number of liters of H₃PO₄. Convert to ml and fill in the answer ☺!

$$M = \frac{n}{V} \quad V = \frac{n}{M} \quad V = \frac{0.00793 \text{ mol}}{0.250 \frac{\text{mol}}{\text{L}}} \quad V = 0.0317 \text{ liters} \quad \boxed{V = 31.7 \text{ ml}}$$

ANSWERS

2. Repeat the above procedure for the following problem: How many ml of a 0.312 M solution of $\text{Pb}(\text{NO}_3)_2$ are needed to react completely with 75.0 ml of 0.500 M NaI?



$\text{Pb}(\text{NO}_3)_2$		NaI
60.1 ml	V	75.0 ml
0.312 M	M	0.500 M
0.0188 moles	n	0.0375 moles

$$M = \frac{n}{V} \quad n = (0.500 \frac{\text{moles}}{\text{L}})(0.0750 \text{ L}) = 0.0375 \text{ moles NaI}$$

$$0.0375 \text{ mol NaI} \times \frac{1 \text{ mol Pb}(\text{NO}_3)_2}{2 \text{ mol NaI}} = 0.01875 \text{ mol Pb}(\text{NO}_3)_2$$

$$M = \frac{n}{V} \quad V = \frac{n}{M} \quad V = \frac{0.01875 \text{ mol}}{0.312 \frac{\text{mol}}{\text{L}}}$$

$$V = 0.0601 \text{ liters} \quad \boxed{V = 60.1 \text{ ml}}$$