

**LESSON**  
**92**

**CLASSWORK**

# Mole Tunnel Stoichiometry

Name \_\_\_\_\_

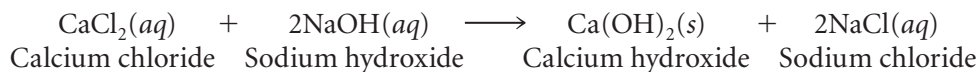
Date \_\_\_\_\_ Period \_\_\_\_\_

## Purpose

To practice performing stoichiometric calculations.

## Part I: Root Canal

1. Calcium hydroxide is sometimes used in dentistry to temporarily fill the space left by a root canal. The equation for the formation of calcium hydroxide is this:



Calculate the molar mass of each substance and fill in the table.

	Reactant		Product	
	CaCl <sub>2</sub>	NaOH	Ca(OH) <sub>2</sub>	NaCl
Molar mass				

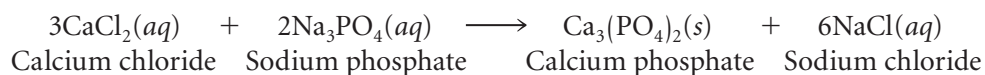
Imagine that a dentist performs this reaction four times using different amounts of the reactants. Figure out the amounts of each compound.

Reaction	Quantity	CaCl <sub>2</sub> (aq)	NaOH(aq)	Ca(OH) <sub>2</sub> (s)	NaCl(aq)
1	moles	1.00 mol	2.00 mol	1.00 mol	2.00 mol
	grams	111.0 g	80.0 g	74.1 g	117.0 g
2	moles			0.500 mol	
	grams	55.5 g		37.0 g	58.5 g
3	moles		0.200 mol	0.100 mol	
	grams				
4	moles				
	grams			10.0 g	

- How many moles of Ca(OH)<sub>2</sub> are formed for every mole of NaOH used?
- For every 0.50 mol of Ca(OH)<sub>2</sub> formed, how many moles of NaCl are formed?
- Why isn't the number of grams of CaCl<sub>2</sub> identical to that of Ca(OH)<sub>2</sub>?
- How many grams of calcium chloride do you need to make 20.0 g of calcium hydroxide?

## Part 2: Human Bones

1. The chemical equation for the reaction that forms calcium phosphate, the main ingredient in bones, is this:



Calculate the molar mass of each substance and fill in the table.

	Reactant		Product	
	$\text{CaCl}_2$	$\text{Na}_3\text{PO}_4$	$\text{Ca}_3(\text{PO}_4)_2$	$\text{NaCl}$
Molar mass				

Imagine that this reaction is repeated three times in the laboratory using different amounts of reactants. Complete the table.

Reaction	Quantity	$\text{CaCl}_2(aq)$	$\text{Na}_3\text{PO}_4(aq)$	$\text{Ca}_3(\text{PO}_4)_2(s)$	$\text{NaCl}(aq)$
1	moles	3.00 mol	2.00 mol	1.00 mol	6.00 mol
	grams	333 g	328 g	310 g	351 g
2	moles			2.00 mol	
	grams	666 g		620 g	702 g
3	moles				
	grams			9.92 g	

- For every mole of  $\text{Na}_3\text{PO}_4$  used, how many moles of  $\text{Ca}_3(\text{PO}_4)_2$  are formed?
- For every 0.500 mol of  $\text{Ca}_3(\text{PO}_4)_2$  formed, how many moles of  $\text{CaCl}_2$  are used?
- How many grams of calcium chloride do you need to make 20.0 g of human bone (calcium phosphate)?

**5. Making Sense** Outline the steps you took to calculate the number of grams of calcium chloride needed to make 20.0 g of calcium phosphate.

**6. If You Finish Early** How many moles of product would you make if you added 10.0 g of  $\text{CaCl}_2$  to 10.0 g of  $\text{NaOH}$ ?