

Chemistry CP

Name: _____

Review Sheet—Chapter 9

Date: _____

After studying Chapter 9, you should be able to:

- Interpret balanced chemical equations in terms of interacting moles, representative particles, masses, and volumes (at STP).
- Construct mole ratios from balanced chemical equations and apply these ratios in calculating mole-mole stoichiometric quantities.
- Calculate stoichiometric quantities from balanced chemical equations using units of mass.
- Calculate stoichiometric quantities from balanced chemical equations using units of moles, mass, representative particles, and volume (gases at STP).
- Identify the limiting reagent in a reaction and use it to calculate stoichiometric quantities and the amount of excess reagent(s).
- Calculate the theoretical yield, actual yield, and/or percent yield for a chemical reaction.

Essential skills from previous chapters:

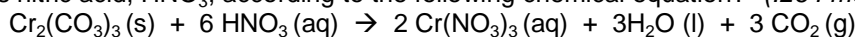
- Polyatomic ions (you will be given a list of the –ates)
- Correct formula writing
- Writing formulas from names
- Writing names from formulas
- Balancing equations

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| Useful conversion factors: 1 mol = 6.02×10^{23} particles 1 kg = 1000 g 1 mol gas = 22.4 L (at STP) |
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Problems for you to try:

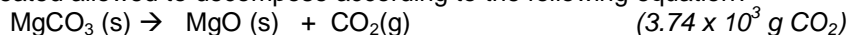
Remember to always start with a balanced equation!

1. How many moles of carbon dioxide gas can be produced if 25.0 g of $\text{Cr}_2(\text{CO}_3)_3$ are reacted with excess nitric acid, HNO_3 , according to the following chemical equation? (.264 mol CO_2)



| | | | | | |
|-----------------|--|--|--|--|--|
| Moles | | | | | |
| g = moles x gfm | | | | | |

2. What mass in grams of carbon dioxide is produced if 85.0 mol of magnesium carbonate, MgCO_3 , are heated allowed to decompose according to the following equation?



| | | | |
|-----------------|--|--|--|
| Moles | | | |
| g = moles x gfm | | | |

3. Iron reacts with oxygen to produce iron (III) oxide, or rust. Write a balanced equation for this reaction. If an iron nail with a mass of 4.3 g reacts completely with oxygen, how many grams of rust would be produced? (6.1 g rust)

$$\underline{\hspace{1cm}} \text{Fe} + \underline{\hspace{1cm}} \text{O}_2 \rightarrow \underline{\hspace{1cm}} \text{Fe}_2\text{O}_3$$

| | | | |
|-----------------|--|--|--|
| Moles | | | |
| g = moles x gfm | | | |

4. One method of producing copper metal is to heat a mixture of copper (I) oxide with copper (I) sulfide. The other product is SO₂. How many kilograms of copper (I) oxide must be reacted with 10.0 kg of copper (I) sulfide to achieve a complete reaction for both reactants?

(18.0 kg copper (I) oxide)

balanced equation: $\underline{\hspace{1cm}} \text{Cu}_2\text{O} + \underline{\hspace{1cm}} \text{Cu}_2\text{S} \rightarrow \underline{\hspace{1cm}} \text{Cu} + \underline{\hspace{1cm}} \text{SO}_2$

| | | | | |
|-----------------|--|--|--|--|
| Moles | | | | |
| g = moles x gfm | | | | |

5. Phosphorus and bromine react vigorously together to form PBr₃.
- If 5.00 g of phosphorus and 35.0 g of bromine react, which is the limiting reactant?
 - How many grams of PBr₃ will be produced?
 - If the actual yield of PBr₃ is 30.0 g, what is the percent yield?

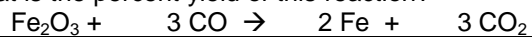
(bromine, 40.0 g PBr₃, 76% yield)

BONUS: How many molecules of PBr₃ will be produced?

$$\underline{\hspace{1cm}} \text{P} + \underline{\hspace{1cm}} \text{Br}_2 \rightarrow \underline{\hspace{1cm}} \text{PBr}_3$$

| | | | |
|-----------------|--|--|--|
| Moles | | | |
| g = moles x gfm | | | |

6. When 84.8 g of iron (III) oxide reacts with an excess of carbon monoxide, 54.3 g of iron is produced. What is the percent yield of this reaction?



(91.6% yield)

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|-----------------|--|--|--|--|
| Moles | | | | |
| g = moles x gfm | | | | |

7. Aluminum chloride is made by reacting scrap aluminum with chlorine gas.
- Which is the limiting reactant when 3.5 g Al and 5.6 g Cl₂ react?
 - How many grams of aluminum chloride are produced?
 - What is the mass of the remaining excess reactant when the reaction is complete?
(chlorine, 7.0 g aluminum chloride, 2.1g Al excess)



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|-----------------|--|--|--|
| Moles | | | |
| g = moles x gfm | | | |