

Chapter 9-5a



Chapter 9-5b



Chapter 9-14a + 14b

- Goal:
 1) Calculate number of moles of each product
 2) Calculate number of grams of each product

Starting Info:
 1) 0.50 moles of red reactant



Solution: Stoichiometry!
 1) Equation is balanced

$$0.50 \text{ moles } \cancel{\text{NH}_3} \times \frac{1 \text{ mol } \text{NH}_4\text{Cl}(\text{s})}{1 \text{ mol } \cancel{\text{NH}_3}(\text{g})} = 0.50 \text{ moles } \text{NH}_4\text{Cl}(\text{s})$$

$$0.50 \text{ moles } \cancel{\text{HCl}(\text{g})} \times \frac{53.491 \text{ g } \text{NH}_4\text{Cl}(\text{s})}{1 \text{ mol } \cancel{\text{HCl}(\text{g})}} = 27 \text{ g } \text{NH}_4\text{Cl}(\text{s})$$

14b See start as 14a



Solution:
 $0.50 \text{ moles } \cancel{\text{S}(\text{s})} \times \frac{1 \text{ mol } \text{S}_2(\text{g})}{4 \text{ mol } \cancel{\text{S}(\text{s})}} = 0.13 \text{ moles } \text{S}_2(\text{g})$

$$0.50 \text{ moles } \cancel{\text{S}(\text{s})} \times \frac{2 \text{ mol } \text{H}_2\text{S}(\text{g})}{4 \text{ mol } \cancel{\text{S}(\text{s})}} = 0.25 \text{ moles } \text{H}_2\text{S}(\text{g})$$

$$0.13 \text{ moles } \cancel{\text{S}_2(\text{g})} \times \frac{76.139 \text{ g } \text{S}_2(\text{g})}{1 \text{ mol } \cancel{\text{S}_2(\text{g})}} = 9.9 \text{ g } \text{S}_2(\text{g})$$

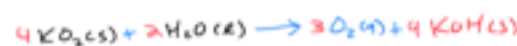
$$0.25 \text{ moles } \cancel{\text{H}_2\text{S}(\text{g})} \times \frac{34.1 \text{ g } \text{H}_2\text{S}(\text{g})}{1 \text{ mol } \cancel{\text{H}_2\text{S}(\text{g})}} = 8.5 \text{ g } \text{H}_2\text{S}(\text{g})$$

Chapter 9-16a + b

- Goal:
 1) Calculate the moles of the first product
 if 0.675 moles of the second product form



Balanced



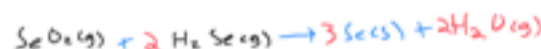
Stoichiometry!

$$0.675 \text{ moles } \cancel{\text{KOH}(\text{s})} \times \frac{3 \text{ mol } \text{O}_2(\text{g})}{4 \text{ mol } \cancel{\text{KOH}(\text{s})}} = 0.506 \text{ moles } \text{O}_2(\text{g})$$

Part b:



Balanced



Stoichiometry!

$$0.675 \text{ moles } \cancel{\text{H}_2\text{O}(\text{g})} \times \frac{3 \text{ moles } \text{Se}(\text{s})}{2 \text{ moles } \cancel{\text{H}_2\text{O}(\text{g})}} = 1.01 \text{ moles } \text{Se}(\text{s})$$

Chapter 9-24a + b

- Goal:
 Calculate the number of moles of the second reactant required to react completely with 0.557 g of the first reactant.

Reaction: **Unbalanced!**



Balanced



Solution:

grams 1st \rightarrow moles 1st \rightarrow moles 2nd

$$0.557 \text{ g } \cancel{\text{Al}(\text{s})} \times \frac{1 \text{ mol } \cancel{\text{Al}(\text{s})}}{26.98 \text{ g } \cancel{\text{Al}(\text{s})}} \times \frac{3 \text{ mol } \text{Br}_2(\text{l})}{2 \text{ mol } \cancel{\text{Al}(\text{s})}} = 0.031 \text{ moles } \text{Br}_2$$

Reaction for Part b



Balanced

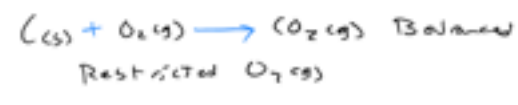


Solution

$$0.557 \text{ g } \text{Hg}(\text{l}) \times \frac{1 \text{ mol } \text{Hg}(\text{l})}{200.59 \text{ g } \text{Hg}(\text{l})} \times \frac{2 \text{ mol } \text{HClO}_4(\text{aq})}{1 \text{ mol } \text{Hg}(\text{l})} = 0.0055 \text{ moles } \text{HClO}_4$$

Chapter 9-29

Open atmosphere



Goal:

1) Determine mass of product for each reaction when 5.00 g C(s) is burned.

Solution: Stoichiometry!

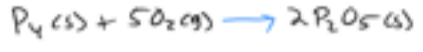
grams C(s) \rightarrow moles C(s) \rightarrow moles Product
 \downarrow
 mass Product

Rxn 1
 $5.00 \text{ g C(s)} \times \frac{1 \text{ mol C(s)}}{12.01 \text{ g C(s)}} \times \frac{1 \text{ mol CO}_2(g)}{1 \text{ mol C(s)}} \times \frac{44.01 \text{ g CO}_2}{1 \text{ mol CO}_2(g)} = 18.3 \text{ g CO}_2$

Rxn 2
 $5.00 \text{ g C(s)} \times \frac{1 \text{ mol C(s)}}{12.01 \text{ g C(s)}} \times \frac{2 \text{ mol CO(g)}}{1 \text{ mol C(s)}} \times \frac{28.01 \text{ g CO}}{1 \text{ mol CO(g)}} = 23.3 \text{ g CO}$

Chapter 9-35

Reaction: Balanced



Goal:

If 4.95 g $P_4(s)$ is burned, what mass of O_2 is required?

Solution: Stoichiometry!

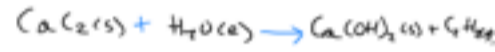
mass $P_4(s) \rightarrow$ moles $P_4(s) \rightarrow$ moles $O_2(g)$
 \downarrow
 mass $O_2(g)$

$4.95 \text{ g P}_4(s) \times \frac{1 \text{ mol P}_4(s)}{123.9 \text{ g P}_4(s)} \times \frac{5 \text{ mol O}_2(g)}{1 \text{ mol P}_4(s)} \times \frac{32 \text{ g O}_2(g)}{1 \text{ mol O}_2(g)} = 6.39 \text{ g O}_2$

Chapter 9-45

Goal: Use BCA tables to determine the limiting reactant and the mass of excess reactant. Start w/ 5.00 moles of each reactant

Reaction: Unbalanced



Balanced

	$CaC_2(s)$	$+ 2H_2O(l)$	\rightarrow	$Ca(OH)_2(s)$	$+ C_2H_2(g)$
B	5.00	5.00		0	0
C	-2.50	-5.00		+2.50	+2.50
A	2.50	0		2.50	2.50

Excess Limiting

Mass of Excess:

$2.50 \text{ mol CaC}_2(s) \times \frac{64.099 \text{ g CaC}_2(s)}{1 \text{ mol CaC}_2(s)} = 160. \text{ g CaC}_2(s)$

Chapter 9-48 a+h

Goal:

1) Determine the limiting reactant, and calculate the mass of the Red Product. 1.00g of each reactant is present

Reaction: Unbalanced!



Balanced



1) Need moles for BCA table

$1.00 \text{ g S}_2(l) \times \frac{1 \text{ mol S}_2(l)}{76.13 \text{ g S}_2(l)} = 0.0131 \text{ mol S}_2(l)$

$1.00 \text{ g O}_2(g) \times \frac{1 \text{ mol O}_2(g)}{32 \text{ g O}_2(g)} = 0.0313 \text{ mol O}_2(g)$

2) Construct BCA Table

	$S_2(l)$	$+ 2O_2(g)$	\rightarrow	$CO_2(g)$	$+ 2SO_2(g)$
B	0.0131	0.0313		0	0
C	-0.0131	-0.0262		+0.0131	+0.0262
A	0	0.0051		0.0131	0.0262

Limiting Excess

Need mass

$0.0131 \text{ mol O}_2(g) \times \frac{44.01 \text{ g CO}_2(g)}{1 \text{ mol CO}_2(g)} = 0.577 \text{ g CO}_2(g)$

Part B

Same strategy as Part A

Reaction: Unbalanced



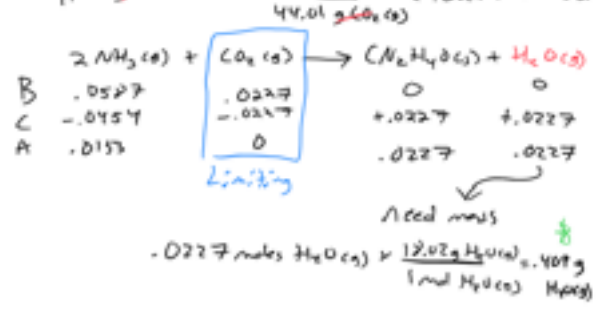
Balanced



1) Need moles for BCA Table

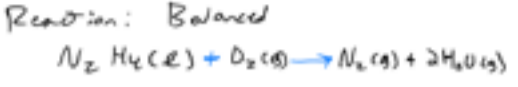
$1.00 \text{ g NH}_3(g) \times \frac{1 \text{ mol NH}_3(g)}{17.03 \text{ g NH}_3(g)} = 0.0587 \text{ mol NH}_3(g)$

$1.00 \text{ g CO}_2(g) \times \frac{1 \text{ mol CO}_2(g)}{44.01 \text{ g CO}_2(g)} = 0.0227 \text{ mol CO}_2(g)$



Chapter 9-90

Goal: How many moles of each product are formed when 20.0g of each reactant is present? How many grams?



1) Need moles for BCA table

$20.0 \text{ g N}_2\text{H}_4(\text{l}) \times \frac{1 \text{ mol N}_2\text{H}_4(\text{l})}{32.05 \text{ g N}_2\text{H}_4(\text{l})} = 0.624 \text{ mol N}_2\text{H}_4(\text{l})$

$20.0 \text{ g O}_2(\text{g}) \times \frac{1 \text{ mol O}_2(\text{g})}{32.0 \text{ g O}_2(\text{g})} = 0.625 \text{ mol O}_2(\text{g})$

Construct BCA



$0.624 \text{ mol N}_2(\text{g}) \times \frac{28.02 \text{ g N}_2(\text{g})}{1 \text{ mol N}_2(\text{g})} = 17.5 \text{ g N}_2(\text{g})$

$1.25 \text{ mol H}_2\text{O}(\text{g}) \times \frac{18.02 \text{ g H}_2\text{O}(\text{g})}{1 \text{ mol H}_2\text{O}(\text{g})} = 22.5 \text{ g H}_2\text{O}(\text{g})$