Today: Section 3.1 - 3.3 or 3.4 September 13th

Sunday 9/15 problem club with Kendall, Eppley 111 7:30-9

Monday: ch. 3

Tuesday: Expt. 4, Study pre-lab for quiz. Bring Laptops

$T_{bp} = 77K$

$T_K = T_C + 273$

$T_C = T_K - 273$

$= 77 - 273$

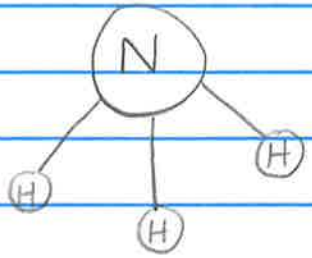
CH_4 = methane

↳ methane combustion

COMBUSTION RXN:

$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

	C	
4	H	4
4	O	4



NH_3 — ball & stick model

4 7 4 6

$\cancel{4}NH_3 + \cancel{7}O_2 \rightarrow \cancel{4}NO_2 + \cancel{6}H_2O$

	N	
6	H	6
7	O	7

$NO_2 + NH_3 \rightarrow N_2 + H_2O$

$2Fe_2O_3 + 3C \rightarrow \cancel{4}Fe + 3CO_2$ ⇝ $2Fe_2O_3 + 3C \rightarrow 4Fe + 3CO_2$

2 mol Fe_2O_3 3 mol C 4 mol Fe 3 mol CO_2

	Fe	
3	C	3
6	O	6

2 mol Fe_2O_3 ≏ 3 mol C

↳ $\frac{3 \text{ mol C}}{2 \text{ mol } Fe_2O_3}$

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$2Fe_2O_3 + 3C \longrightarrow 4Fe + 3CO_2$

$2\,mol\,Fe_2O_3$ $3\,mol\,C$ $4\,mol\,Fe$ $3\,mol\,CO_2$

$0.144\,mol\,Fe_2O_3$ How much C do we need?

$$n_C = \frac{0.144\,mol\,Fe_2O_3 \mid 3\,mol\,C}{2\,mol\,Fe_2O_3} = 0.216\,mol\,C$$

How many moles of Iron, Fe do we expect?

$$n_{Fe} = \frac{0.144\,mol\,Fe_2O_3 \mid 4\,mol\,Fe}{2\,mol\,Fe_2O_3} = 0.288\,mol\,Fe$$

(given) (stoichiometry)

* GOOD ANALOGY *

(bread) (cheese) (pickles) (sandwiches)

$2Br + Ch + 5pi \longrightarrow 1sa$

$m_A \xrightarrow{MM} n_A \xrightarrow{stoich} n_B \xrightarrow{MM} m_B$

ex: How many moles of carbon are needed to react with 149g of Fe_2O_3?

$2Fe_2O_3 + 3C \longrightarrow 4Fe + 3CO_2$

GO Moles! $149\,g$

Atomic Mass

Fe	55.845×2
O	16.00×3
MM (molar mass)	$159.69\,g/mol$

$$n_{Fe_2O_3} = \frac{149\,g\,Fe_2O_3 \mid 1\,mol\,Fe_2O_3}{159.7\,g\,Fe_2O_3} = \boxed{0.933\,mol\,Fe_2O_3}$$

$$n_C = \frac{0.933\,mol\,Fe_2O_3 \mid 3\,mol\,C}{2\,mol\,Fe_2O_3} = \boxed{1.40\,mol\,C}$$

(given) (stoichiometry)

→ what mass of C is produced?   September 13th

$m_C = \frac{1.40 \text{ mol C}}{} \Big| \frac{12.011 \text{ g C}}{1 \text{ mol C}} = \boxed{16.8 \text{ g of C}}$

2Br + Ch + 5pi ⟶ Sa

100 sl   50 sl   250 sl   50

↑ theoretical yield

actual yield ≤ 50

96% ← Day 1   48   Percent Yield: 100% * $\frac{\text{Act.}}{\text{Theor.}}$

80% ← Day 2   40

100% ← Day 3   50

2Br + Ch + 5pi ⟶ Sa

84 sl   40 sl   5555 pi

60 slices!

÷2   ÷1 *limiting reagent   ÷5 / 1.111

42   (40) ↳ cannot make any more sandwiches after the cheese runs out!!!

Determine LR by ÷ by coefficients & smallest # = LR