

## Chapter 3 — Problems 36, 48, & 62

Michael Brodskiy

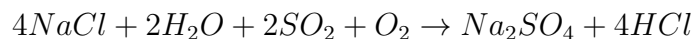
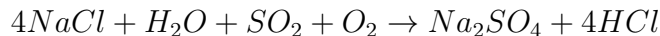
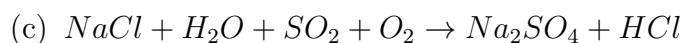
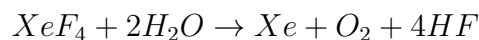
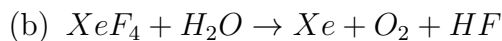
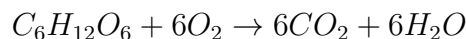
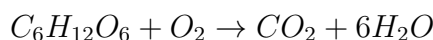
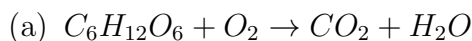
Instructor: Mr. Morgan

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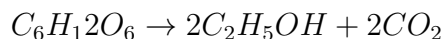
36. Nickel reacts with sulfur to form a sulfide. If 2.986[g] of nickel reacts with enough sulfur to form 5.433[g] of nickel sulfide, what is the simplest formula of the sulfide? Name the sulfide.

$$\begin{aligned}\frac{2.986}{59} &= .051[\text{mol}]Ni \cdot 1.051 = 1 \cdot 2 = Ni_2 \\ 5.433 - 2.986 &= 2.447[\text{g}]S \rightarrow \frac{2.447}{32} = .076[\text{mol}] \cdot 1.051 = 1.5 \cdot 2 = S_3 \\ Ni_2S_3 &\rightarrow \text{Nickel (III) Sulfide}\end{aligned}$$

48. Balance the following equations:



62. When corn is allowed to ferment, the fructose is converted to ethyl alcohol according to the following reaction:



- (a) What volume of ethyl alcohol ( $\rho = 0.789[\text{g mL}^{-1}]$ ) is produced from one pound of fructose?

$$1[lb] = 453.592[\text{g}] \rightarrow \frac{453.592}{180} = 2.51[\text{mol}]$$

$$2 \cdot 2.51[\text{mol}] = 5.02[\text{mol}] \text{ ethyl alcohol} \cdot 46[\text{g mol}^{-1}] = 230.9[\text{g}] \rightarrow \frac{230.9}{.789} = 293[\text{mL}]$$

- (b) Gasohol can be a mixture of 10[mL] ethyl alcohol and 90[mL] of gasoline. How many grams of fructose are required to produce the ethyl alcohol in one gallon of gasohol.

$$1[gal] = 3785[\text{mL}] \rightarrow 378.5[\text{mL}] \text{ ethyl alcohol} \cdot .789 = 298.64[\text{g}]$$

$$\frac{298.64}{46} = 6.49[\text{mol}] \cdot .5 = 3.25[\text{mol}] \text{ fructose} \cdot 180 = 585[\text{g}] \text{ fructose}$$