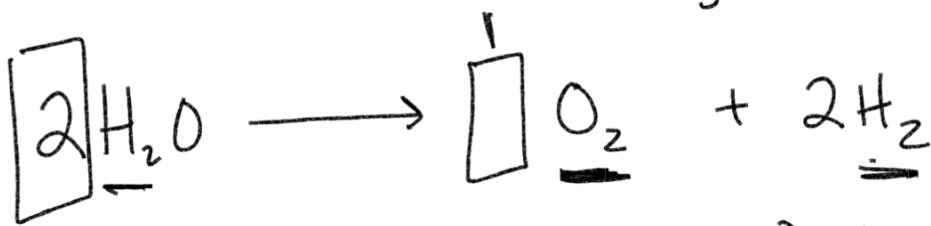


W-6C General Chemistry 1/26



500g H<sub>2</sub>O How much (mass) O<sub>2</sub> is created from 500g H<sub>2</sub>O?

$$500 \text{ g H}_2\text{O} * \frac{1 \text{ mol H}_2\text{O}}{18.015 \text{ g H}_2\text{O}} * \frac{1 \text{ mol O}_2}{2 \text{ mol H}_2\text{O}} * \frac{31.998 \text{ g O}_2}{1 \text{ mol O}_2}$$

$$2 \text{ H} = 2 * 1.008 = 2.016$$

$$1 \text{ O} = 1 * 15.999 = 15.999$$

$$\frac{15.999}{18.015}$$

$$\text{O}_2 = 2 * 15.999 = 31.998$$

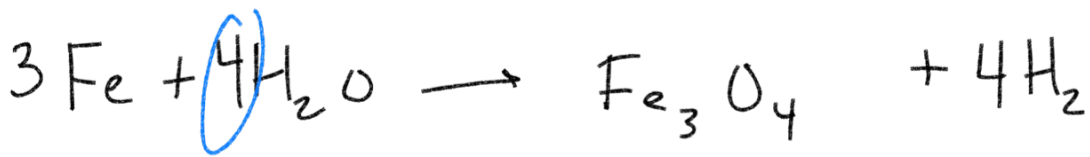
$$= \boxed{444 \text{ g}}$$



200g Na<sub>2</sub>O How much Na is produced?

$$200 \text{ g Na}_2\text{O} * \frac{1 \text{ mol Na}_2\text{O}}{61.979 \text{ g Na}_2\text{O}} * \frac{4 \text{ mol Na}}{2 \text{ mol Na}_2\text{O}} * \frac{22.99 \text{ g Na}}{1 \text{ mol Na}}$$

$$\boxed{148 \text{ g Na}}$$



80g Fe      which is the rate limiting reagent?

120g H<sub>2</sub>O      1<sup>st</sup> molar mass      stoich      last molar mass

$$80 \text{g Fe} * \frac{1 \text{ mol Fe}}{55.845 \text{g Fe}} * \frac{4 \text{ mol H}_2}{3 \text{ mol Fe}} * \frac{2.016 \text{g H}_2}{1 \text{ mol H}_2}$$

$$3.85 \text{g H}_2$$

$$120 \text{g H}_2\text{O} * \frac{1 \text{ mol H}_2\text{O}}{18.015 \text{g H}_2\text{O}}$$

$$13.4 \text{g H}_2$$

~~$$\frac{4 \text{ mol H}_2}{4 \text{ mol H}_2}$$~~

$$\frac{2.016 \text{g H}_2}{1 \text{ mol H}_2}$$

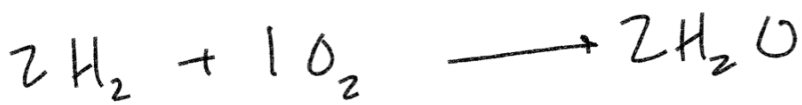
Limiting Reagent: Fe  
Excess Reagent: H<sub>2</sub>O

$$80 \text{g Fe} * \frac{1 \text{ mol Fe}}{55.845 \text{g Fe}} * \frac{4 \text{ mol H}_2\text{O}}{3 \text{ mol Fe}} * \frac{18.015 \text{g H}_2\text{O}}{1 \text{ mol H}_2\text{O}}$$

limiting

$$= 34.4 \text{g H}_2\text{O used}$$

$$\text{started with } 120 \text{g} - \text{used } 34.4 \text{g} = 85.6 \text{g H}_2\text{O in excess}$$



60 g  $\text{H}_2$

250 g  $\text{O}_2$

- How much  $\text{H}_2\text{O}$  was produced?
- What is the limiting reagent?
- How much excess reagent is left?

$$60\text{g H}_2 * \frac{1\text{ mol H}_2}{2.016\text{g H}_2} * \frac{2\text{ mol H}_2\text{O}}{2\text{ mol H}_2} * \frac{18.015\text{g H}_2\text{O}}{1\text{ mol H}_2\text{O}} = 536\text{g H}_2\text{O}$$

$$250\text{g O}_2 * \frac{1\text{ mol O}_2}{31.998\text{g O}_2} * \frac{2\text{ mol H}_2\text{O}}{1\text{ mol O}_2} * \frac{18.015\text{g H}_2\text{O}}{1\text{ mol H}_2\text{O}} = 281\text{g H}_2\text{O}$$

Limiting reagent  $\text{O}_2$

excess reagent 29 g  $\text{H}_2$

$$60 - 31 = 29\text{g H}_2$$

$$\begin{array}{r} 281\text{g H}_2\text{O} \\ - 250\text{g} \text{ came from } \text{O}_2 \\ \hline \end{array}$$

31 g of  $\text{H}_2$