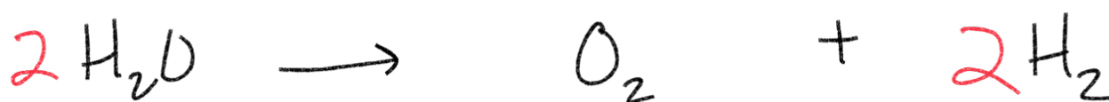
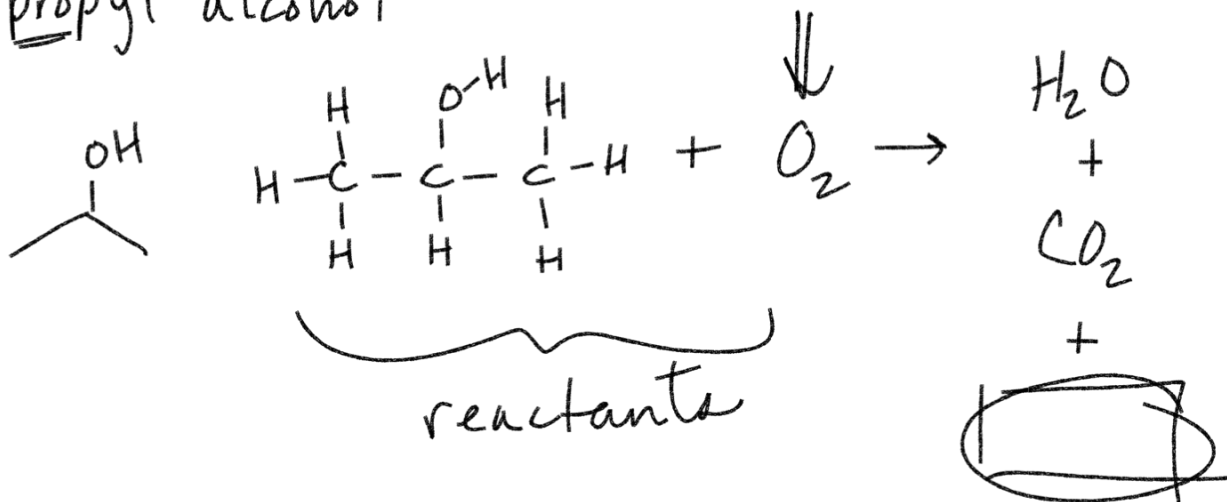


Isopropyl alcohol



500g of H_2O How much (mass) O_2 is generated?

444g O_2

$$500 \text{g H}_2\text{O} \times \frac{1 \text{ mol H}_2\text{O}}{18.015 \text{g H}_2\text{O}} \times \frac{1 \text{ mol O}_2}{2 \text{ mol H}_2\text{O}} \times \left[\frac{31.998 \text{g O}_2}{1 \text{ mol O}_2} \right]$$

initial molar amount

molar ratio

mass → molar mass
or
volumes → molar volume
or
atms → Av #

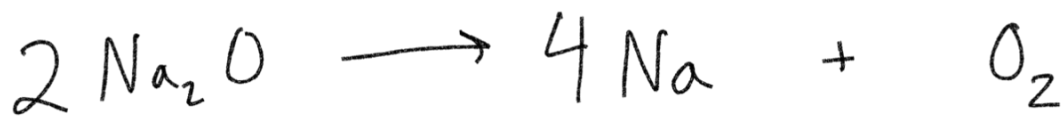
$$2\text{H} = 2 \times 1.008 = 2.016$$

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

$$18.015 \text{g/mol}$$

$$\text{O}_2 = 2 \times 15.999 = 31.998 \text{g/mol}$$

$$\text{molar volume} = \frac{22.4 \text{ L}}{1 \text{ mol}}$$



If start with 200g Na_2O , how much O_2 is produced

— mass → * molar mass
 volume →

of atoms →

$$\left[200\text{g Na}_2\text{O} * \frac{1 \text{ mol Na}_2\text{O}}{61.979 \text{ g Na}_2\text{O}} * \frac{1 \text{ mol O}_2}{2 \text{ mol Na}_2\text{O}} * \frac{31.998 \text{ g O}_2}{1 \text{ mol O}_2} \right]$$

51.6 g O_2

molar volume

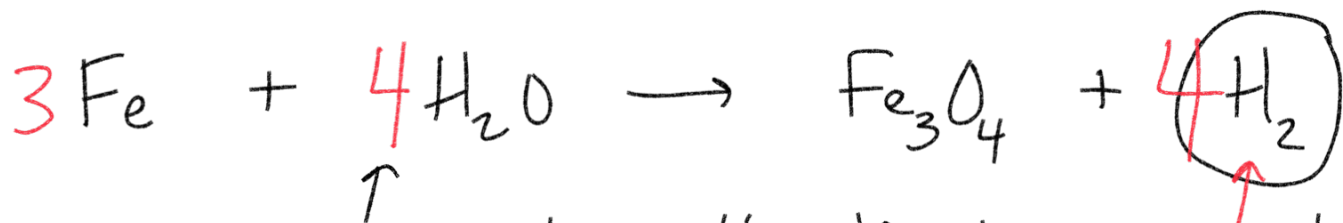
$$\left[200\text{g Na}_2\text{O} * \frac{1 \text{ mol Na}_2\text{O}}{61.979 \text{ g Na}_2\text{O}} * \frac{1 \text{ mol O}_2}{2 \text{ mol Na}_2\text{O}} * \frac{22.4 \text{ L O}_2}{1 \text{ mol O}_2} \right]$$

36.1 L

of atoms

$$\left[200\text{g Na}_2\text{O} * \frac{1 \text{ mol Na}_2\text{O}}{61.979 \text{ g Na}_2\text{O}} * \frac{1 \text{ mol O}_2}{2 \text{ mol Na}_2\text{O}} * \frac{6.022 * 10^{23} \text{ atoms}}{1 \text{ mol O}_2} \right]$$

$9.7 * 10^{23}$ atoms



80g Fe

What is the limiting reagent

120g H₂O molar mass molar ratio

$$\text{80g Fe} * \frac{1 \text{ mol Fe}}{55.845 \text{ g Fe}} * \frac{4 \text{ mol H}_2}{3 \text{ mol Fe}} = 1.91 \text{ mol H}_2$$

limited

$$120 \text{ g H}_2\text{O} * \frac{1 \text{ mol H}_2\text{O}}{18.015 \text{ g H}_2\text{O}} * \frac{4 \text{ mol H}_2}{4 \text{ mol H}_2\text{O}} = 6.66 \text{ mol H}_2$$

excess

$$1.91 \text{ mol H}_2 * \frac{2.016 \text{ g H}_2}{1 \text{ mol}} = \boxed{3.85 \text{ g}}$$