

### Lesson 3: Gas Stoichiometry

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- use gas laws and molar volume to help perform calculations

- $\underline{n} = m/M$ ,

- $\underline{n} = v/V_m$ , or

- $PV = \underline{n}RT$

$V_m$  = volume that  
one mole of  
a gas occupies  
at STP or SATP

Example

$$n = \frac{V}{V_m}$$

$$PV = nRT$$
$$V = n V_m$$

If 300 g of propane burns in a gas barbeque, what volume of oxygen at SATP is required for the reaction?



$$m = 300 \text{ g}$$

$$M = 44.11 \text{ g/mol}$$

$$n = \frac{m}{M} = 6.801 \dots$$

$$V = ?$$
$$n = 34.005 \dots$$

$$V_m = 24.8 \text{ L/mol}$$

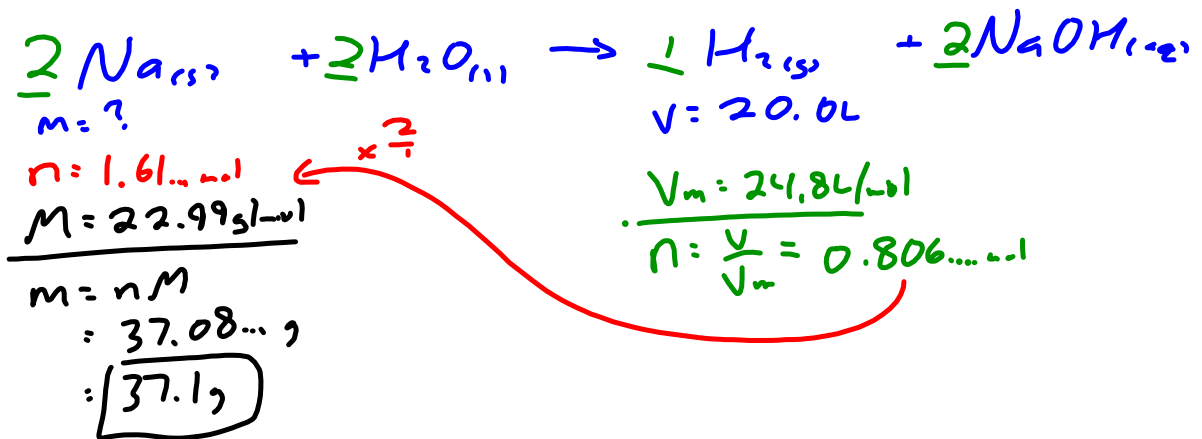
$$V = n V_m$$

$$= 843.346 \dots \text{ L}$$

$$= \boxed{843 \text{ L}}$$

Example

Hydrogen gas is produced when sodium metal is added to water. What mass of sodium is necessary to produce 20.0L of hydrogen gas at SATP?



Example

What volume of  $\text{CO}_2(\text{g})$  is produced at 94.5 kPa and  $115.5^\circ\text{C}$  in the exhaust of a car if 100 g of gasoline ( $\text{C}_8\text{H}_{18}(\text{l})$ ) is burned?

