

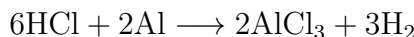
# Chem Honors Study Guide 6

Test 3 S2

Test date: TBD

## 1 Gasses and Heat in Stoichiometry

### Gasses



At STP, how many *ml* of  $\text{H}_2$  gas are produced from 12 *g* of solid Al? (1 *mol* = 22.4 *L* at STP)

Using stoichiometry:

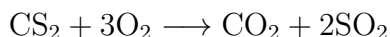
$$\begin{aligned} (12 \text{ g Al}) \times \left( \frac{1 \text{ mol Al}}{26.98 \text{ g Al}} \right) \times \left( \frac{3 \text{ mol H}_2}{2 \text{ mol Al}} \right) \times \left( \frac{22.4 \text{ L H}_2}{1 \text{ mol H}_2} \right) \times \left( \frac{1000 \text{ ml}}{1 \text{ L}} \right) \\ = \boxed{14944.4 \text{ ml}} \end{aligned}$$

### Heats of Formation

$\Delta H_f$  is the heat absorbed/released when compounds are formed from elemental units. The  $\Delta H_f$  of elements, including diatomic elements, is always 0.

Heats of formation equation:

$$\Delta H_{\text{rxn}} = \sum \Delta H_{\text{f(products)}} - \Delta H_{\text{f(reactants)}} \quad (1)$$



Find the heat of formation given the following:

$$\Delta H_f(\text{CO}_2) = -393.5 \frac{\text{kJ}}{\text{mol}}$$

$$\Delta H_f(\text{SO}_2) = -296.8 \frac{\text{kJ}}{\text{mol}}$$

$$\Delta H_f(\text{CS}_2) = 87.9 \frac{\text{kJ}}{\text{mol}}$$

Solution: Using 1:

$$\begin{aligned} & [-393.5 + 2(-296.8)] - [3(0) + 87.9] \\ &= \boxed{1075 \frac{kJ}{mol}} \end{aligned}$$