3. Calculate the heat released when 1.43 moles of SO_2 reacts according to the following equation.

$2SO_2 + O_2 \rightarrow 2SO_3 \quad \Delta H = -99.1\ kJ$

$$\frac{1.43\ \text{moles } SO_2}{1} \left| \frac{-99.1\ kJ}{2\ \text{mole } SO_2} \right. = -70.8565\ kJ = \boxed{-70.9\ kJ}$$

4. Given the following reaction: $C_{(s)} + 2\ S_{(s)} + 89.3\ kJ \rightarrow CS_{2(l)}$ Reactant = endo

How many atoms (particles) of Carbon can be burned if 520.0 kJ of energy are available?

$$\frac{520.0\ kJ}{+89.3\ kJ} \left| \frac{1\ \text{mole C}}{1\ \text{mole C}} \right| \frac{6.02 \times 10^{23}\ \text{atom C}}{1} = 3.50549 \times 10^{24}\ \text{atom C}$$

$$= \boxed{3.51 \times 10^{24}\ \text{atom C}}$$

From Rxn

↑ Conversions always 1 mole

5. a. If the following reaction produces energy ($\Delta H = -357\ kJ$)

is this an endo or exothermic reaction? exothermic b/c ΔH is negative

$CH_4 + 2\ O_2 \rightarrow CO_2 + 2\ H_2O$

b. Is the energy written on the reactant or product side of the equation? product b/c exo is produce

c. If 15.0 grams of CH_4 reacts with excess oxygen how much energy is produced?

$$\frac{15.0\ g\ CH_4}{1} \left| \frac{1\ \text{mole } CH_4}{16.05\ g\ CH_4} \right| \frac{-357\ kJ}{1\ \text{mole } CH_4} = -333.6449\ kJ$$

$$= \boxed{-334\ kJ}$$

↑ Conversion molar mass always 1 mole

From Rxn