Stoichiometry – Calculating Quantities in Chemical Reactions

Example: Moles <–> Moles conversion.

1) Aluminum reacts with bromine to form aluminum bromide (used as an acid catalyst in organic synthesis).

$$Al(s) + Br_2(l) \rightarrow Al_2Br_6(s) \quad \text{[unbalanced]}$$

How many moles of Al are needed to form 2.43 mol of Al_2Br_6?

Practice/Exploration: Check if you're already in moles, if not, a)find a way to convert to moles, then b)convert to moles of the other substance in the reaction using coefficients from the chemical equations, then c)convert to the infomation/unit requested for your answer.

2) **Mass Stoichiometry**- What mass of nitrogen gas is required to react completely with 2.79 g of hydrogen gas to produce ammonia? 2) _____

$$N_2 + 3H_2 \rightarrow 2NH_3$$

3) **Solution Stoichiometry**- What volume (in Liters) of 0.200 *M* H_2SO_4 solution is required to react exactly with 0.050 L of 0.100 *M* KOH? 3) _____

$$H_2SO_4(aq) + 2KOH(aq) \rightarrow 2H_2O(l) + K_2SO_4(aq)$$

4) **Gas Stoichiometry**- What volume of CO_2 gas at STP could be produced by the decomposition of 45.0 g of $CaCO_3$? 4) _____

$$CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$$

5) **Energy Stoichiometry**- Given that $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(s)$, heat of reaction = −64.8 kJ/mol, how many grams of CaO must react in order to liberate 525 kJ of heat? 5) _____

1) 4.86 mol
2) 12.9 g
3) 0.0125 L
4) 10.1 L
5) 454 g