Competition Corner: Pathway Audit

g10_u01_w01 | defend the representation

Safe challenge: Use only the provided data cards. No reaction, heating, gas generation, or chemical handling is requested. Frozen values: Mg 24.305, O 15.999, Fe 55.845, C 12.011, H 1.008.

1. A team writes $2Mg + O_2 \rightarrow 2MgO$ and begins with 6.00×10^{22} Mg atoms, excess O_2. One student converts atoms directly to grams of MgO using magnesium's molar mass. Diagnose the representation error, then calculate the correct predicted mass of MgO.

2. Data card: 15.0 g Fe and 12.0 g O_2 are proposed for $4Fe + 3O_2 \rightarrow 2Fe_2O_3$. Determine the limiting reactant, theoretical grams of Fe_2O_3, and grams of excess reactant remaining.

3. A report says a closed-system theoretical prediction is 18.6 g product, but a balance reading is 19.1 g. Compute the apparent percent yield. Give two evidence-based explanations that do *not* claim atom creation, and name one check you would request before choosing between them.

4. Challenge comparison: For $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$, compare possible moles of CO_2 from 0.180 mol propane and from 0.750 mol O_2. Identify the limiter and defend why comparing raw starting mole amounts alone is insufficient.