

Competition Corner: Which Claim Is Limited?

g10_u01_w04 | audit the denominator

Safe challenge: Analyze only supplied paper data. No heating, gas collection, or chemical handling is requested. Frozen values: H 1.008, N 14.007, O 15.999, Al 26.982, Cl 35.450, Fe 55.845.

1. A card gives 10.00 g ore, modeled as 80.0% Fe_2O_3 , and 5.00 g CO. Under $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$, determine the limiting reactant, theoretical Fe mass, and excess mass of the other reactive component. Explain which denominator belongs in percent yield if the actual Fe card reads 5.00 g.

2. Two teams use the same 5.00 g Mg sample, modeled as 80.0% Mg. Team A divides its 6.00 g MgO card by 5.00 g and calls the result 120% yield. Team B divides by its MgO theory. Resolve the disagreement quantitatively and name the two different percentages Team A has mixed.

3. A product card reports 38.5 g AlCl_3 from the Week 4 chlorine-limited model. Give at least three non-sensational explanations that must be checked before concluding mass conservation failed. Then calculate the apparent percent yield.

4. A sample can be 75% pure and still have a 90% yield. Construct a one-sentence explanation using a 100 g imaginary feed: identify the mass that is reactive, the mass that is inert, and the product comparison that defines yield.
