

1. Once upon a time 4 young geckos were trapped, transported to Philadelphia and placed for sale in a pet store window. A young scientist, needing experimental subjects, bought them and brought them back to his lab. He wrapped one of the geckos in 76.31 g of magnesium ribbon and then placed the gecko in a solution of nickel II sulfate. How many atoms of nickel will be produced in the experiment?
2. Later, the scientist straps a beaker containing 138.6 mL of a 2.15 M solution of aluminum acetate to one gecko and 17.66 g of sodium hydroxide to another and then forces them to run at each other at high speed. In the ensuing collision and reaction, how many g of the insoluble product will be formed?
3. Several months later, having been subjected to additional reaction and various physical changes, the geckos escape into the sewers where they are met and befriended by a deaf capybara named Pimple who teaches them then the fine art of debate. After some time underground, they begin to appear at political rallies where they ask difficult questions that point out the ambiguities in various situations and leave the pundits gasping for soundbites. Thus were born the Pre-Adolescent Mutant Debating Geckos (known to their friends and enemies alike as the PAMDGs). At one particular rally against imperfect lab results, the speaker decomposes 18.11 g of ammonium oxalate, recovering 18.11 grams of the solid product, thereby “proving” the perfection of his technique. The PAMDGs point out that this result is actually pretty bad. How bad is it? In other words, what is the percent yield in this experiment?
4. Working in a special chamber designed to conceal his efforts, the scientist plots a way to recover the geckos. He concocts a secret compound made of carbon hydrogen and oxygen that he can use as a lure. To ensure the purity of his product he burns 19.81 g of the compound obtaining 29.04 g of carbon dioxide and 11.86 g of water. What is the empirical formula of the compound? If the molar mass is 180 g/mol, what is the molecular formula?
5. Lured into his trap the PAMDGs find themselves in a small cage dangling over a lava pit. To escape, they mix 27.4 g of sodium with 81.9 g of chlorine, with the intention of using the salt produced to rust the bars of the cage. How many g of sodium chloride will be produced, what is the limiting reagent, which reactant is in excess and how much excess is there?
6. Having escaped, the PAMDGs attack the scientist with a verbal barrage that would have crushed a lesser intellect. Fighting back in the only way he can, the scientist pours 135.6 mL of 3.97 M chlorous acid on the solid gold arguments thrown at him. How many grams of gas will be produced in this effort?