Chemistry 20

Unit D: Quantities in chemical change

Reaction types and balanced equations

Names and masses

- A lab page can name the chemicals in a reaction and, on the next line, record how many grams were used.
- The name answers what is present, and the gram record answers how much was measured.

Predicted products

- Five familiar patterns decide the product formulas before any coefficient is chosen.
- After the formulas are fixed, each coefficient is a count of atoms, of molecules, and of moles.

Key terms

formation reaction

A pattern in which separate reactants combine and a single product is formed. (2 Na + Cl_2 ⟶ 2 NaCl)

coefficient

A whole number written in front of a formula to count formula units while the formula stays fixed. (2 H_2)

qualitative analysis

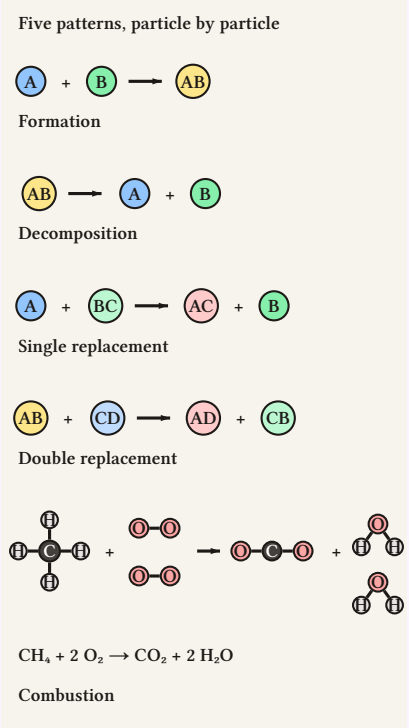
Work that names which substances are present in a sample. (identity)

quantitative analysis

Work that measures how much of a named substance is present. (mass or moles)

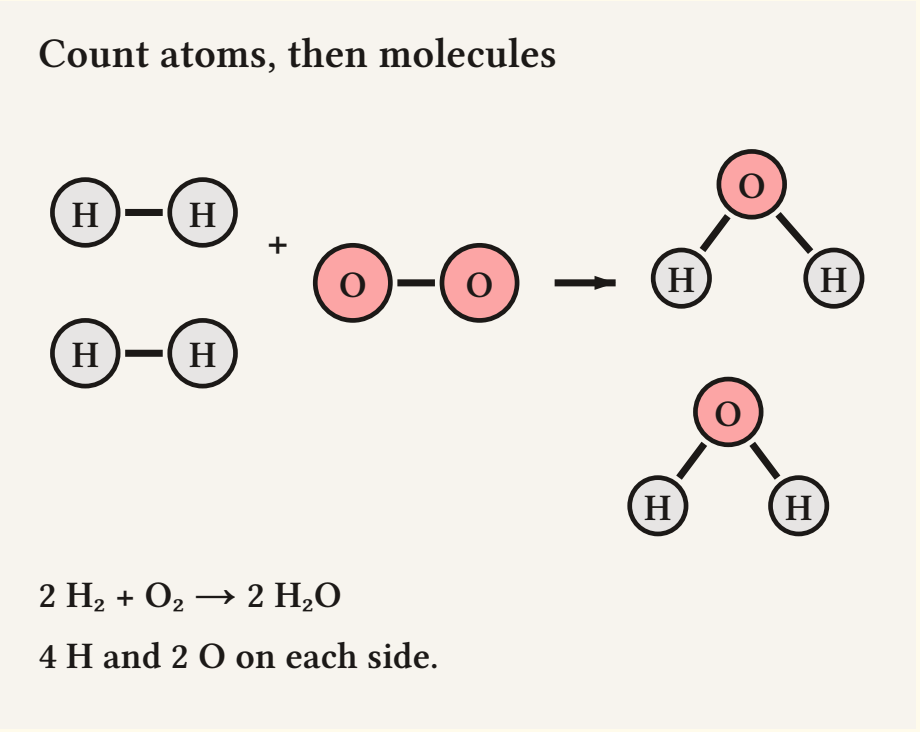
Five patterns decide the products

- Formation joins reactants into one product, and decomposition splits one reactant apart.
- Complete combustion of a hydrocarbon in oxygen produces carbon dioxide and water.



One equation, three ways to count

- The balanced hydrogen-oxygen equation uses the same formulas chemists already know from Science 10.
- Each front number is doing counting work for atoms, for molecules, and for moles.



Methane combustion

- The skeleton $CH_4 + O_2 \longrightarrow CO_2 + H_2O$ already shows the correct product formulas for complete combustion.
- Lowest whole-number coefficients finish the atom match for carbon, hydrogen, and oxygen.



Patterns and amounts

- A single heated reactant and a hydrocarbon flame are two different product predictions.
- Naming the chemicals is a different job from reporting how many moles the coefficients count.

Image credits

Lisafern, Gas stove burner flame, CC0 1.0