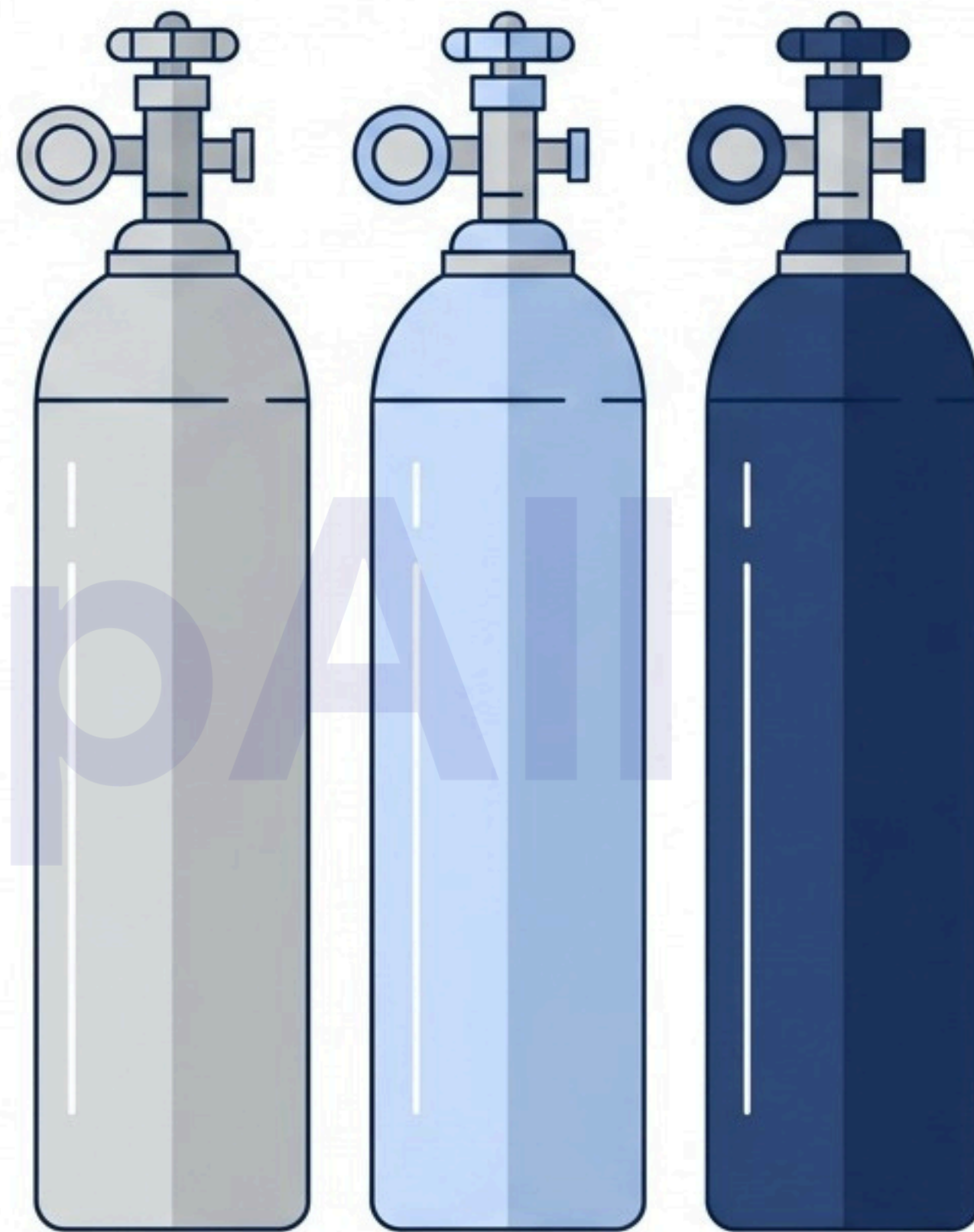




Gay Lussac's Law of Gaseous Volumes

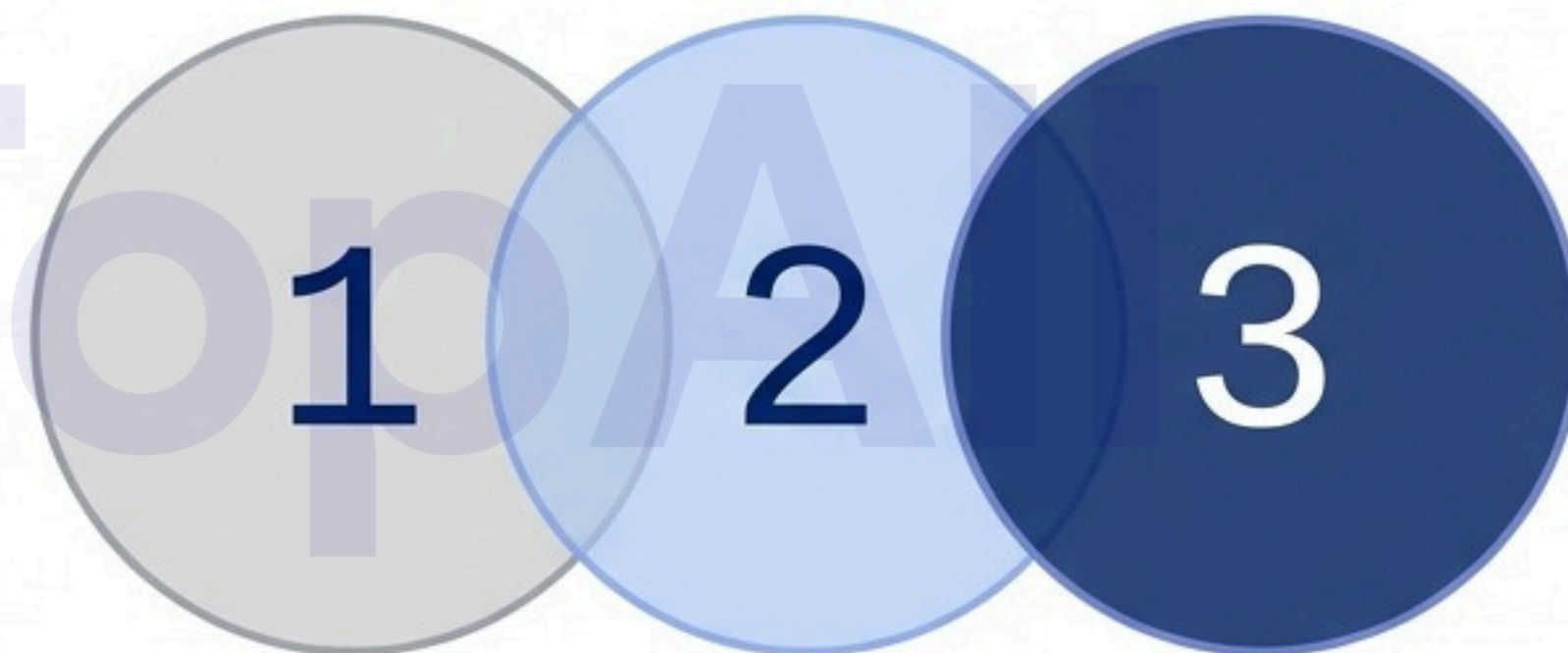
Master the integer ratios
of reacting gases.



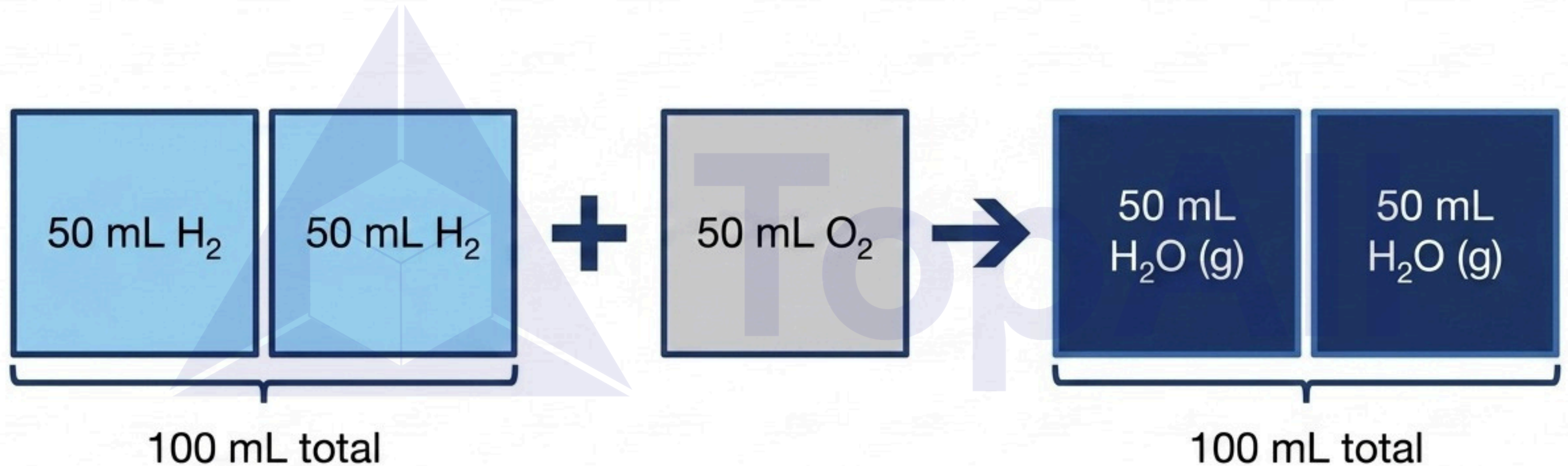
Core Concept: Simple Volume Ratios



- Discovered in 1808 by Joseph Louis Gay Lussac.
- When gases combine or are produced in a chemical reaction, they do so in a **simple whole-number ratio** by volume.
- *Think of it as the Law of Definite Proportions, but for measurable volumes instead of mass.*



Visualizing the Law: The Formation of Water





You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



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Formula & Rule Bank



The Reaction: $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g})$

The Volume Ratio: 100mL : 50mL : 100mL

2 : 1 : 2

Rule of Thumb: For gaseous reactions, the stoichiometric coefficients directly equal the volume ratios.

Critical Conditions



JEE TRAP ALERT

Trap 1: Variable Conditions

The law only holds true if all gases are measured at the **same temperature and pressure**. If T or P changes during the reaction, the volume ratios will not match the simple integers.

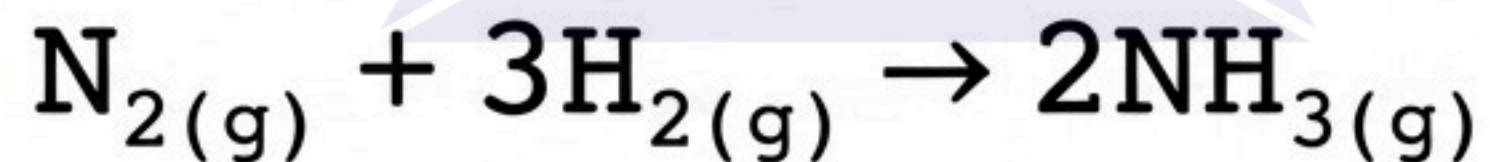
Trap 2: Including Non-Gases

Volume ratios only apply to species in the **gaseous state** (g). Do not apply these ratios to solids (s) or liquids (l) in the same reaction equation.

Mini Application: Test Your Knowledge

The Prompt

Consider the Haber process for synthesizing ammonia. What is the gas-volume ratio for the reactants and products?



The Solution

Ratio = 1 : 3 : 2

(1 volume of nitrogen gas reacts with 3 volumes of hydrogen gas to produce 2 volumes of ammonia gas).

Quick Recap

✓ KEY TAKEAWAYS

- ✓ **1. The Law:** Gas volumes combine (or are produced) in small, whole-number ratios.
- ✓ **2. The Condition:** All gases must be at the exact same temperature and pressure.
- ✓ **3. The Shortcut:** Stoichiometric coefficients = Volume ratios (for gases only).



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