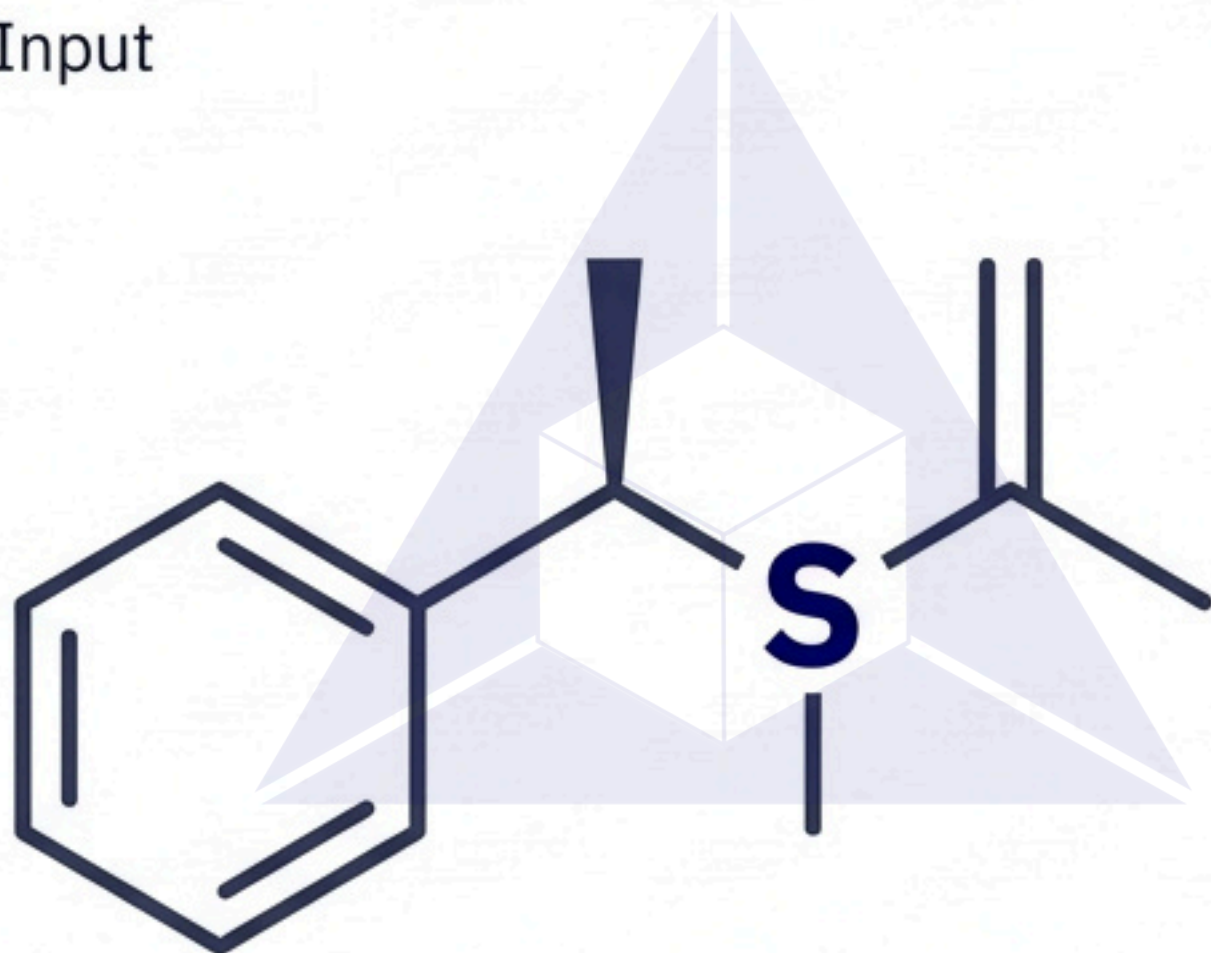


Quantitative Estimation of Sulphur via the Carius Method

The Input



Initial Sample Mass: m g

The Process

1. Oxidize

Convert unmeasurable, covalently bonded organic sulphur into measurable inorganic sulfate ions.

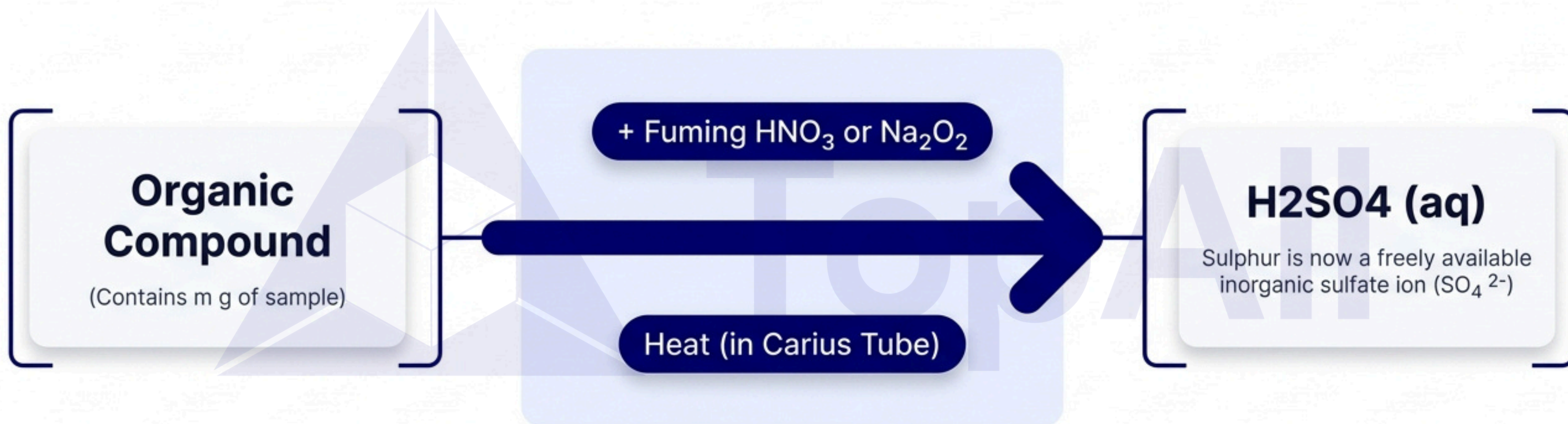
2. Precipitate

Force the aqueous sulfate ions out of the solution into a physical, solid form.

3. Weigh

Apply gravimetric analysis to isolate the solid and mathematically trace back to the percentage of sulphur.

Oxidizing Organic Sulphur into Aqueous Sulphuric Acid



Note: The intense oxidation destroys the organic framework, leaving the sulphur fully oxidized.



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$$E=mc^2$$



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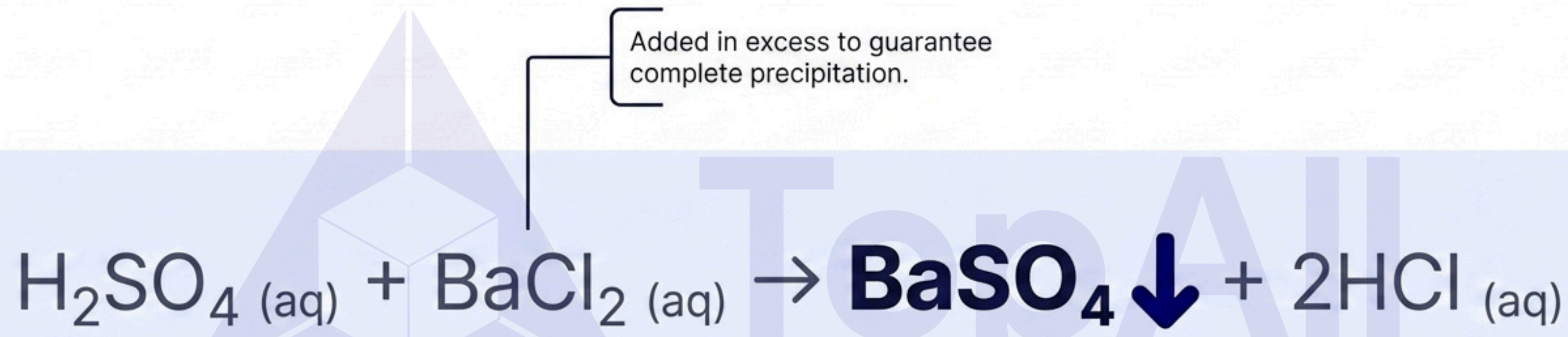
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Trapping Sulfate Ions as a Barium Sulphate Precipitate



Phase change: Aqueous to Solid. The sulphur is now physically trapped.

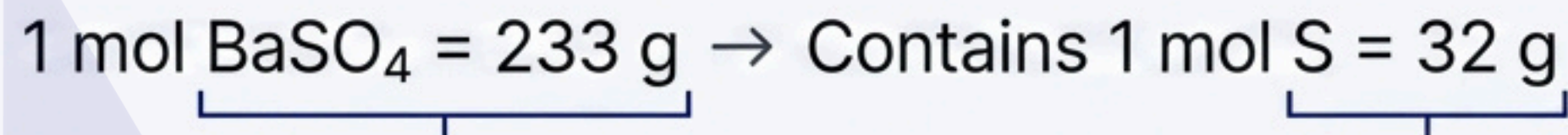
Isolating the Solid Precipitate for Gravimetric Measurement



Mapping the Mass of Barium Sulphate back to Percentage Sulphur

Stoichiometry Map

Top Tier
Molar Relationship



Middle Tier
Scaling to Sample

Therefore, our isolated m_1 g of BaSO_4 contains: $(32 \times m_1) / 233$ g of Sulphur.

Bottom Tier
The Master Formula

$$\%S = \left[\frac{32 \times m_1 \times 100}{233 \times m} \right] \%$$

Atomic mass of Sulphur

Mass of the dried precipitate

Molar mass of BaSO_4

Initial mass of the organic compound

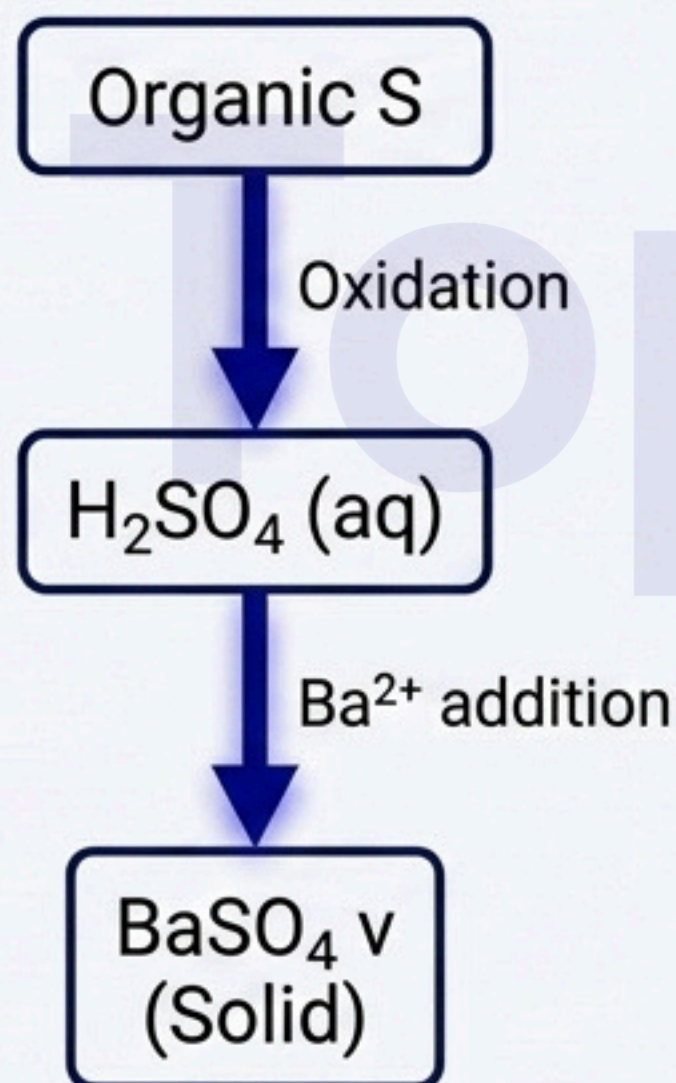
The Carius Method for Sulphur: Revision Frame

Method & Reagents

- Apparatus: Carius Tube
- Oxidizing Agents: Fuming HNO_3 or Na_2O_2
- Precipitating Agent: Excess BaCl_2 (aq)



The Core Chemical Pathway



The Master Formula

$$\%S = \left(\frac{32}{233} \right) \times \left(\frac{m1}{m} \right) \times 100$$

$m1$ = precipitate mass
 m = compound mass



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