

Strontium Sulfite Reaction With HCl

<https://gemini.google.com/app/d1465824d83674eb>

Response: To determine which compound satisfies all conditions when treated with excess dilute HCl:

1. Identification of the Evolved Gas:

- The gas turns filter paper soaked with acidified potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) green.
- Acidified $\text{K}_2\text{Cr}_2\text{O}_7$ (orange, $\text{Cr}_2\text{O}_7^{2-}$) reduces to Cr^{3+} (green) when exposed to a reducing gas like **sulfur dioxide** (SO_2).
- Therefore, the evolved gas must be SO_2 .

2. Reaction of Candidates with Dilute HCl:

- **(1) ZnBr_2 :** Soluble salt. Does not evolve gas upon addition of dilute HCl.
- **(2) Ag_2CO_3 :** Reacts to form CO_2 gas and white insoluble precipitate of AgCl ($\text{Ag}_2\text{CO}_3(s) + 2\text{HCl}(aq) \rightarrow 2\text{AgCl}(s) + \text{H}_2\text{O}(l) + \text{CO}_2(g)$). Does not give a clear solution or SO_2 gas.
- **(3) $\text{Na}_2\text{S}_2\text{O}_3$:** Reacts with acid to produce SO_2 gas, but simultaneously forms a colloidal yellow precipitate of elemental sulfur ($\text{S}_2\text{O}_3^{2-} + 2\text{H}^+ \rightarrow \text{S}(s) + \text{SO}_2(g) + \text{H}_2\text{O}(l)$). This results in a cloudy/turbid mixture, not a clear solution.
- **(4) SrSO_3 :** Strontium sulfite is insoluble in water, but reacts with dilute HCl to form soluble strontium chloride, water, and sulfur dioxide gas:



- $\text{SrCl}_2(aq)$ dissolves completely to give a **clear solution**.
- The evolved SO_2 **gas** turns acidified $\text{K}_2\text{Cr}_2\text{O}_7$ green.
- **(5) $\text{Cr}(\text{OH})_3$:** Reacts with HCl to form a solution (CrCl_3), but no gas is evolved.

The correct option is **(4) SrSO_3** .
