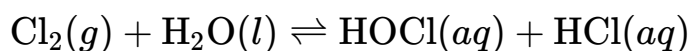


Chlorine Disproportionation and Oxidizing Strength

<https://gemini.google.com/app/3127424a7cee4721>

Response: **Statement 1 Evaluation**

When Cl_2 gas reacts with water, it sets up the equilibrium:



- Oxidation number of Cl in $\text{Cl}_2 = 0$
- Oxidation number of Cl in $\text{HOCl} = +1$ (oxidized)
- Oxidation number of Cl in $\text{HCl} = -1$ (reduced)

Because the same element (Cl) is simultaneously oxidized and reduced, this reaction is a **disproportionation reaction**.

- **Statement 1 is TRUE.**

Statement 2 Evaluation

Among the oxoacids of chlorine (HOCl , HClO_2 , HClO_3 , and HClO_4), oxidizing strength decreases as the number of oxygen atoms increases. Hypochlorous acid (HOCl) has the standard reduction potential highest in this series, making it the strongest oxidizing agent among them due to the relative instability of the O-Cl bond and lower thermodynamic stability compared to the perchlorate ion (ClO_4^-).

- **Statement 2 is TRUE.**

Relationship Between Statement 1 and Statement 2

Although both statements are factually correct, the high oxidizing ability of HOCl is not the underlying chemical reason why Cl_2 disproportionates in water (which is driven by standard reduction potentials of chlorine species in aqueous medium and hydrolytic equilibria).

- **Statement 2 does NOT correctly explain Statement 1.**

Correct Answer Option (G.C.E. A/L Assertion-Reasoning Standard)

- **Option 2:** Both statements are true, but Statement 2 does not correctly explain Statement 1.
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