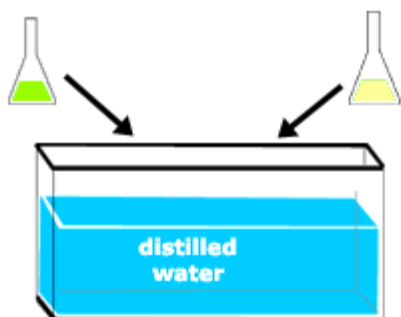
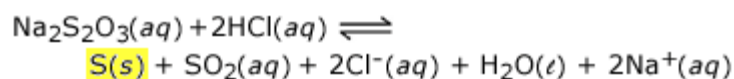


## CIA Demonstration: Tyndall Effect

key concepts:

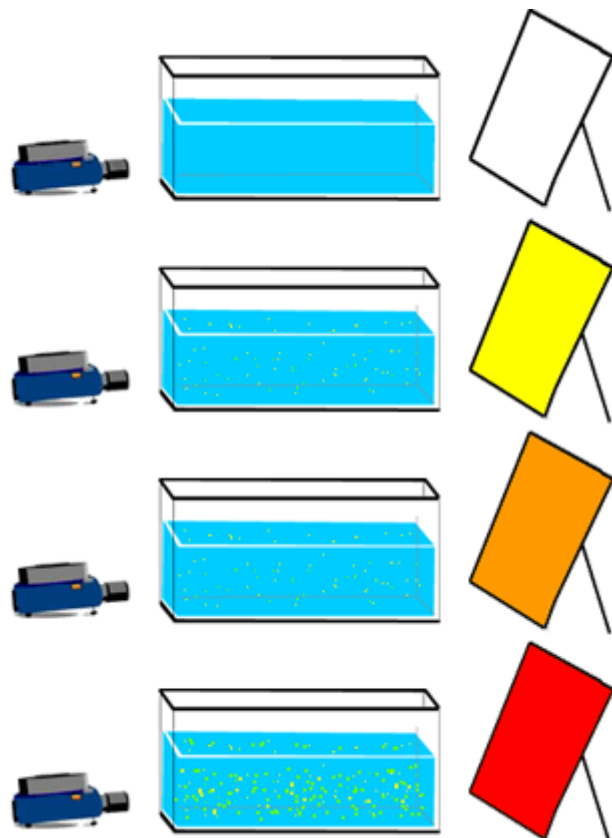
- Sodium thiosulfate and hydrochloric acid react to form a **sol** of elemental sulfur in water.
- As the particles grow larger, only longer wavelengths can pass through the mixture.



A saturated sodium thiosulfate ( $\text{Na}_2\text{S}_2\text{O}_3$ ) solution is combined with 6 M hydrochloric acid (HCl) in an aquarium filled with distilled water. Sodium thiosulfate and hydrochloric acid react to form solid elemental sulfur.

The solid elemental sulfur forms a sol with the water. A sol is a **colloid** composed of a solid (the sulfur) dispersed in a liquid (the water).

As the reaction progresses, more and more sulfur is produced.



The **Tyndall effect** is the scattering of light by the particles of a dispersed substance observed when a beam of light is projected through a colloid.

Before the reaction, the beam of the projector passes through the aquarium without being scattered.

When a small amount of solid sulfur forms, the beam of the projector is scattered. Several wavelengths are present, so the light scattering onto the poster board appears yellow.

As more sulfur is produced, the suspended particles become larger. The shorter wavelengths of light are not able to pass through the mixture, so the light scattering onto the poster board appears orange.

As still more sulfur is produced, only longer wavelengths (red light) can pass through the mixture, and the poster board appears red.