Chemical Sunset

**Description:** Light scattering is observed as colloidal sulfur is precipitated from $\text{Na}_2\text{S}_2\text{O}_3$.

**Materials:**

- 0.1 M $\text{Na}_2\text{S}_2\text{O}_3$
- Petri dish
- 6 M HCl
- Glass rod

**Procedure:**

Perform this demonstration on an overhead projector with the classroom lights dimmed or off for best viewing.

1. Cut a hole the size of the Petri dish in a manila folder and cover the overhead projector. Place the Petri dish in the hole of the folder and add enough 0.1 M $\text{Na}_2\text{S}_2\text{O}_3$ to cover the bottom of the dish.

2. Carefully add 5 mL of concentrated HCl and stir the resulting solution. As sulfur precipitates out of solution, the white light transmitted through the solution will be scattered and a “sunset” observed.

**Discussion:** In this demonstration, colloidal sulfur is generated by the reaction of HCl with $\text{Na}_2\text{S}_2\text{O}_3$ in a two step process involving first the formation of thiosulfuric acid followed by its decomposition to sulfurous acid and colloidal sulfur.

\[
2 \text{H}^+ (aq) + \text{S}_2\text{O}_3^{2-} (aq) \rightarrow \text{H}_2\text{S}_2\text{O}_3 (aq) \\
\text{H}_2\text{S}_2\text{O}_3 (aq) \rightarrow \text{H}_2\text{SO}_3 (aq) + \text{colloidal sulfur}
\]

As the reaction produces colloidal sulfur, the white light passing through the solution is scattered, producing the colors observed due to the Tyndall effect. The colors observed during a natural sunset are a result of the same principle.

**Safety:** Wear proper protective equipment including gloves and safety glasses when preparing and performing this demonstration. Concentrated solutions of acids and bases (>2 M) can irritate the skin and cause burns. When diluting concentrated acids, add the acid to the water to avoid spattering.

**Disposal:** Materials should be neutralized slowly and placed in an aqueous waste container.
References:


Video: [http://www.youtube.com/watch?v=tKrM9FT7vhw](http://www.youtube.com/watch?v=tKrM9FT7vhw)