

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

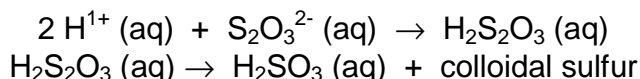
Glass rod

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.



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.

NCSU – Dept. of Chemistry – Lecture Demonstrations

Light and Electron Transitions

References:

Shakhashiri, B. Z. In *Chemical Demonstrations: A Handbook for Teachers of Chemistry*; The University of Wisconsin Press: 1989; Vol. 3, p 353-357.

Ackerson, P. J. *J. Chem. Educ.* **1959**, 36, A309.

For a non-chemical version, see: May, J.C. *J. Chem. Educ.* **1982**, 59, 57.

Video: <http://www.youtube.com/watch?v=tKrM9FT7vhw>