Demonstration of Cold Light

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Many chemical reactions take place with the evolution of heat and light, but only a comparatively small number are known where radiant energy alone is emitted. Most cases of chemiluminescence involve either the use of rare and difficultly obtainable chemicals, or are not sufficiently intense to be suitable for classroom or lecture table demonstration.

The availability of 3-aminophthalhydrazide on the market (1) and the brilliance of and ease of production of chemiluminescent effects by its oxidation in alkaline solutions make the demonstration of cold light a relatively simple matter. If carried out carefully, the oxidation of "luminol" produces sufficient light in a darkened room to make the operator distinctly visible and capable of being photographed. Directions for producing this effect follow.

Dissolve 0.5 g. of 3-aminophthalhydrazide and 15 g. of sodium hydroxide in 5 l. of water contained in a 6-l. Florence flask. Then add 20 cc. of 3 per cent hydrogen peroxide. Gradually introduce small crystals of potassium ferricyanide, $K_3Fe(CN)_6$ and swirl the contents of the flask. As each crystal strikes the surface of the solution, it will appear to glow, and as the oxidant dissolves a greenish-blue light will be emitted from the contents of the flask. The light intensity can be regulated by adding varying quantities of ferricyanide.

Another striking demonstration is effected in the following manner. Prepare a solution of 0.5 g. luminol and 15 g. of sodium hydroxide in 500 cc. of water (Solution A). An equal volume of a saturated solution of potassium ferricyanide containing 60 cc. of 3 per cent hydrogen peroxide is next prepared (Solution B). Immerse a piece of cloth in solution A, remove it and squeeze out the excess of liquid. Then pour some of solution B on the cloth. It will glow brilliantly. If the cloth is then pressed the excess liquid will fall from it like glowing drops of molten metal.

For further information and demonstrations reference is made to an extended discussion of the subject of chemiluminescence by Huntress, Stanley and Parker (2).

REFERENCES

1. Synthetic Organic Chemicals Department of the Eastman Kodak Company, Rochester, N. Y.
2. Huntress, Stanley and Parker, J. Chem. Education *11*, 142 (1934).