

Supercooled Liquid (Sodium Acetate)

Video Link: <http://www.youtube.com/watch?v=qfsfvl7rcpA> ^[1]

Supercooled Liquids

This is a remarkably effective illustration of the transformation of a supercooled liquid to a solid brought about by one seed crystal. The liquid is the trihydrate of sodium acetate, which melts around 65° C. If allowed to cool undisturbed, it will remain liquid and one crystal of the trihydrate will cause an immediate, exothermic solidification.

MATERIALS

- Up to three 500mL flasks with about 200mL of supercooled sodium acetate trihydrate
- Vial of sodium acetate (to use as seed crystals)
- Gloves
- 1000mL beakers or manila folders to pour the liquid onto (optional)

PRESENTATION

Supercooled (definition): Cooling a liquid below its freezing point without it becoming a solid.

This demonstration should be done after a discussion of the melting of solids and the freezing of liquids. The discussion should include the phenomenon of supercooling liquids below their freezing points. Point out that usually such liquids are very unstable and can often be induced to solidify by a slight mechanical disturbance. Mention that solidification can *a/ways* be induced by the addition of a seed crystal.

Option 1

- Hold up a sealed flask of supercooled sodium acetate trihydrate before the class and swirl the liquid
- With as much drama and flourish as you wish, open the flask and drop in a crystal or two of solid sodium acetate trihydrate (It is fun to coat your fingers with the crystals and snap your fingers above the flask)

- The liquid will begin to solidify rapidly
- It takes about 30 seconds for the liquid to solidify completely
- The crystallization is also fairly exothermic, so have several students verify that the flask and contents are now hot

Option 2 (much more visible):

- Place a few crystals of sodium acetate on a manila folder or in a 1000mL beaker.
- Slowly pour the supercooled liquid onto the crystals.
- It is fairly easy to make a tower of crystals while doing this. If you're careful, an arch can be made.

COMMENTS

Whether this is an example of a supersaturated, very concentrated solution or a supercooled liquid is open to debate. The same demo can be used to show supersaturation.

HAZARDS (MSDS links)

Sodium acetate: <http://www.sciencelab.com/msds.php?msdsId=9927412> ^[2]

REFERENCES

L.R. Summerlin and J.L. Ealy, Jr., "Chemical Demonstrations, A Sourcebook for Teachers," vol. 1, p 28.

[Undergraduate](#) ^[3]

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Source URL (retrieved on 01/12/2013 - 5:55am):

http://www.chem.arizona.edu/lecture_demos/cu_ii_conc_cell

Links:

- [1] <http://www.youtube.com/watch?v=qfsfvl7rcpA>
- [2] <http://www.sciencelab.com/msds.php?msdsId=9927412>
- [3] <http://www.chem.arizona.edu/taxonomy/term/11>