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Chemical Christmas Trees

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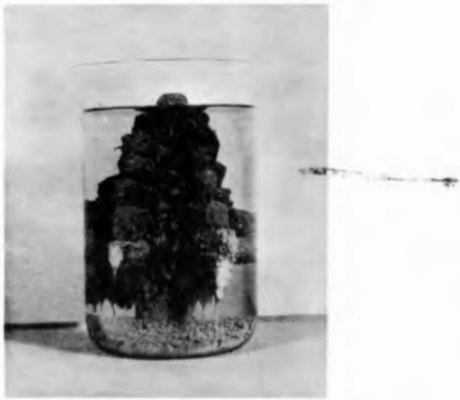
One of the many groups of Wahlert Students who enjoy "Chemist's Tree". Pictured above are Terry Hillary and John Wagner.

The large corridor bulletin boards at Wahlert High School lend atmosphere, color, and spirit especially at Christmas. In the east wing, adjacent to the chem labs, one of these, the "Chemist's Tree" aroused special interest and enthusiasm this year not only to the students but to the faculty as well.

"Chemist's Tree" features the outline of a fir tree. Miniature colorful ornaments in the shape of laboratory equipment decorate it. Each chemistry student prepared one of these which bears a label with a chemical formula on its front and a brief reference to the chemical within. Each "hung" his chemical on the tree. Commonly known chemicals were selected so as to have popular appeal. For example, one student who had the label O_2 wrote: "Oxygen: you're dead without it, but don't let that burn you up." Another with CH_4 said: "Methane: gas that cooks your meals." And still another with $MgSO_4$ wrote: "Epsom salts: you soak your aching feet in it."

In addition to the fact that the "Chemist's Tree" added to the holiday festivities, it also served as a learning motivation device. Sister Mary Cecilia Kuennen, O.S.F. directed the display.



"A Silver-Displacement Christmas Tree"

Chemical Christmas trees are made each year in the Webster City Junior College, under the direction of Roger Volker, science teacher. One of the interesting phenomena in chemistry is the relative activity of metals and their ions in solution. Metals will displace one another from solutions, the more active metal going into solution to displace the less active metal, which subsequenlty precipitates out of solution. In general, metals of smaller atomic weight are more active, while those of larger atomic weight are less active.

We have utilized the activity of copper to displace silver from this solution of silver nitrate, forming beautiful hanging crystals of silver which cover the metal copper "Tree". The reaction proceeds as follows:

$$Cu + 2Ag^{+} + 2NO_3^{-} \rightarrow Cu^{+} - 2NO_3^{-} + 2Ag\downarrow$$

This particular tree grew to full size in about 24 hours, though rate of growth may be controlled by concentration of the metal ions in solution. The concentration was 0.1N $AgNO_3$. Hanging crystal trees of copper may also be formed, using a zinc or aluminum tree immersed in a solution of copper sulfate.

"A Chemical Christmas Tree"

While the Chemical Christmas Tree may not be as spectacular or provoke as much esthetic enjoyment as the Silver-Displacement Tree, nevertheless it is interesting, unusual, and pretty to see.

The beakers and flasks are each filled with a specific reagent which in some cases is colored due to the ions or radicals present, and in other cases is colored because of acidity or basicity of the solution and the presence of an organic indicator whose color changes according to H^{+} or OH^{-} concentration.

$CuCl_2$ solution is green because of the presence of Cu^{++}.

Red solutions here are basic solutions containing the indicator Phenolphthalein.

The indicator Methyl Orange is orange in a base.

Some of the other orange solutions contain K_2CrO_4; the Chromate Radical is yellow orange.

Blue solutions contain $CuSO_4$ and the specific concentration of Cu^{++} determines the blue color

The white "Star" on top is a florence flask filled with Antimony Chloride, $SbCl_3$, which hydrolyzes in aqueous solution to form the white precipitate SbOCl, Antimonyl Chloride.