Classroom Activity Connections

edited by
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A Colorful Connection for Your Classroom

by Linda N. Fanis

From the Editor

World Wide Web Links—Dead or Alive?

Since the first *JCE* Classroom Activity was published in 1997, the Student Activity side of each Activity has listed suggested World Wide Web sites for students to visit. That particular section is currently called "Information from the World Wide Web". Sites typically provide additional background information about the specific topics presented in the Activity, information about related concepts, and more activities and experiments to try. A recent *JCE* article and Especially for High School Teachers column *(1, 2)* discussed the phenomenon of "link rot". Links to specific World Wide Web sites can be fairly fluid—a link might change to a different location, or a particular site might "die". This discussion raised a question in my mind related to the *JCE* Classroom Activity series: how many URLs remain active on the Activities, particularly the early ones? Linda Fanis of the *JCE* staff offered to investigate and the result is below. She checked Activities #2 and #22, which are both related to color. She found significant link rot for the URLs originally listed in these Activities, but offers replacement sites below. She describes each new site, as well as how it might relate to the Activity. If you've ever considered writing an Activity, it offers insight into how an author decides which Web sites to include.

Submit *Your* Ideas!

If you've ever used a *JCE* Classroom Activity, you probably have ideas that could be transformed into a Classroom Activity Connections submission. I'm happy to provide feedback! Or, help us update the feature—would you like to check the links to Web sites for a particular Activity and share new links as needed? Or perhaps search the Activities to label those that are appropriate for particular audiences, such as middle school or early elementary grades? Please email me at *jacobsen@chem.wisc.edu*.

Featured Activities

- Extension to *JCE* Classroom Activity: #22. Colors to Dye for: Preparation of Natural Dyes by *Journal's* Editorial Staff, *J. Chem. Educ.* **1999,** *76,* 1688A–1688B.
- Extension to *JCE* Classroom Activity: #2. Anthocyanins: A Colorful Class of Compounds by *Journal's* Editorial Staff, *J. Chem. Educ.* **1997,** *74,* 1176A–1176B.

New *JCE* Classroom Activities Reprint CD

Both of the Activities mentioned in this Connections article are included on the new *JCE* Classroom Activities Reprint CD. The CD is now available for only $19.95. It includes the first 50 Activities, along with any supplemental materials that were originally published with the Activities. It's a great resource for teachers at any level, outreach coordinators, home schoolers, and anyone who would like to try a hand at kitchen chemistry.

Literature Cited

1. Markwell, J.; Brooks, D. W. *J. Chem. Educ.* **2008,** *85,* 458.
2. Jacobsen, E. K. *J. Chem. Educ.* **2008,** *85,* 333.

Supporting *JCE Online* Material

http://www.jce.divched.org/Journal/Issues/2008/Sep/abs1172.html

Abstract and keywords

Full text (PDF)
Links to cited URLs and *JCE* articles

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Colors to Dye for: Preparation of Natural Dyes

Updating and Extending Activity #22

In this Activity students prepare natural dyes from plant sources and investigate how permanently the dyes color a fabric sample. Three of the four World Wide Web resources listed on the Student Side of Activity #22 have been lost over the years. However, a variety of new, comprehensive dyeing sites are described below. These sites provide background information on dyes, both natural and synthetic, and the dyeing process which leads to a great extension—tie-dyeing!

Natural dyes can be made from a variety of flower, root, and nut sources. Left to right, back row: red onion, lavender, red cabbage; middle row: red beet, spinach leaves, rose, strawberries; front row: raspberries, blackberries, saffron, black tea, turmeric, coffee beans, blueberries.

photo by John W. Moore

Colors to Dye for: Preparation of Natural Dyes, continued

All About Hand Dyeing
http://www.pburch.net/dyeing.shtml

The Student Side of the Activity provides some general background information on dyes and the dyeing process. Paula Burch's All About Hand Dyeing Web site is a great resource for students who want to learn more. The site provides extensive information about multiple types of dyes and dyeing methods. Dyes are categorized by the type of fabric they work best with: cellulose (plant) fibers, protein (animal) fibers, and synthetic (man-made) fibers. While it's clear that Paula prefers to work with synthetic dyes, there is useful information about natural dyes under protein fibers including links to sites on preparing different mordants (color fasteners used with natural dyes). The Web site also includes instructions on different dyeing techniques, as well as a handy FAQ. For information related directly to the Activity, students should be sure to check out the FAQs "What kind of chemical bonds attach dyes to fibers?" and "What's the difference between mordants and other chemical assistants used in dyeing?"

Making Natural Dyes from Plants
http://www.pioneerthinking.com/naturaldyes.html

In the Activity students make two colors of dye using yellow onion skins and blueberries. As an extension students are encouraged to create other colors from natural sources. The Pioneer Thinking Web site lists an index of flowers, nuts, and roots that produce natural dyes in a wide array of colors. Basic directions are given for preparing the dyes, although they are quite similar to the procedure used in the Activity. This site is a great resource if you or your students wish to expand the Activity's color palette.

Natural Dyeing
http://www.vickilicious.com/knit/2008/05/natural-dyeing.html

For a first-person perspective on dyeing fibers using natural sources, students should visit Vicki Boardman's blog, Vickilicious Knits. As a final project for a course called the Chemistry of Artists' Materials, Techniques & Conservation, Boardman chronicles her dyeing experiment in both in text and pictures. On her blog she describes the experimental procedure used and documents each step photographically. The result is an interesting extension of the Activity and a vibrant illustration of the art of dyeing.

photo by Victoria Boardman

Merino wool dyed using natural dyes. The colors are produced from the following (left to right): black tea, spinach mixed with dandelions, alkanet, osage orange, annatto, kamala, sandalwood, cutch.

The Tie-Dye Wiki
http://tie-dyewiki.com

In the Activity students dye small squares of cotton fabric. A natural extension is to dye a T-shirt. For instructions on how to turn a T-shirt into a work of art, students should visit The Tie-Dye Wiki—a site completely dedicated to the art of tie-dyeing! The Web site provides tie-dye instructions using commercial dyes, but the methods can be adapted for use with natural dyes (remember that natural dyes will produce more muted colors). While the original Activity's fourth resource provided folding directions for different tie-dye patterns (this source is still available, but the address has changed to *http://www.prochemical.com/directions/Folding.htm),* the Tie-Dye Wiki includes even more patterns for students to try as well as photos of finished products.

Classroom Activity Connections

Anthocyanins: A Colorful Class of Compounds

Expanding Activity #2

In this Activity students investigate the acid/base properties of household products using a natural anthocyanin indicator they make from plant sources. While it is a great hands-on project, the format of Classroom Activities has been modified over the years to provide more structure and helpful resources. Some of the World Wide Web resources listed are still available, but tend to be repetitive. The new resources listed below expand upon the topic of anthocyanins and other plant pigments, and provide additional activity ideas and extensions.

Chemical of the Week: The Chemistry of Fall Colors

http://scifun.chem.wisc.edu/chemweek/fallcolr/fallcolr.html

Many of the resources listed in the original Activity covered the topic of why leaves change color in the fall. While some of the resources are gone (#1, #3, and #4) and others have been moved (#2 can now be found at *http://www.sciencemadesimple.com/leaves.html*), the Chemical of the Week site provides a concise chemical answer as to why the color change occurs due to the presence of different plant pigments.

Chlorophyll from Spinach: An Improved Method for the Extraction and Thin-Layer Chromatography of Chlorophyll a and b from Spinach

Quach, Hao T.; Steeper, Robert L.; Griffin, G. William. *J. Chem. Educ.* **2004,** *81,* 385.

The Instructor Side of the Activity previously listed a Web resource (# 5) that linked to an experiment for extracting plant pigments, but the link has been lost. Since publishing Classroom Activity #2, this *Journal* has published an article on an improved method of chlorophyll extraction and separation. The laboratory provides a fast and reliable method of extraction, which can be adapted to other plant pigments, and includes online supplemental resources. This is an excellent extension for those who wish to attempt a more advanced laboratory on extraction and analysis in their classrooms.

The anthocyanin found in the petals of petunias (and many other flowers and vegetables) acts as a natural indicator. The indicator solution is purple; in an acidic solution it becomes pink, in a basic solution it becomes green.

General Chemistry Online Acids and Bases: FAQs

http://antoine.frostburg.edu/chem/senese/101/acidbase/faq.shtml

In the Activity students test the acid/base properties of household products, but little information is given on the chemistry of indicators and acids and bases. The General Chemistry Online site has an entire section dedicated to acid/base topics, and the Indicators subsection presents some good information related to the Activity. Students can learn more about natural indicators by reading the FAQ for "What household substances can be used as acid/base indicators?" and "What are some natural acid/base indicators?".

Wiki on Anthocyanins

http://en.wikipedia.org/wiki/Anthocyanins

While teachers and students know they should not rely on Wikipedia as a sole source of information, it does provide a broad overview of anthocyanins and exposes students to the many facets of the molecules. The site can stimulate students to further research a topic introduced in the wiki, for example, learning more about the medical research conducted on anthocyanins and the function of these molecules in plants. It is interesting to note that to date there is no mention of the use of anthocyanins as natural indicators—challenge your students to contribute their own research to the wiki.

photo by Joel Menlemans

Anthocyanins, a class of compounds responsible for the red and purple colors found in plants, are produced in the leaves of certain trees following bright sunny days and dry, cool nights in autumn.

all sites accessed Jun 2008