

# Periodic graphics

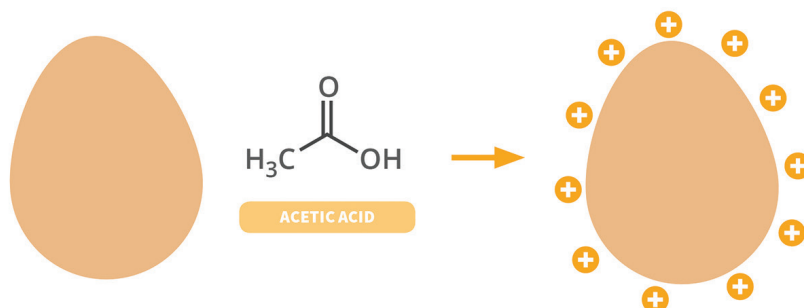
A collaboration between C&EN and  
Andy Brunning, author of the popular  
graphics blog **Compound Interest**

More  
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To see more of  
Brunning's work, go  
to **compoundchem.com**. To see all of  
C&EN's Periodic  
Graphics, visit **cenm.ag/periodicgraphics**.

## DYEING EASTER EGGS

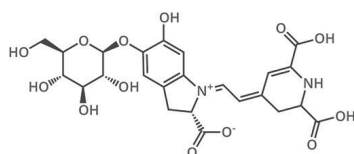
Colorful eggs are an Easter tradition. Here we take a look at the chemistry of the dyeing process, the substances used as natural dyes, and the molecules behind the different colors obtained.



### THE EGG-DYEING PROCESS

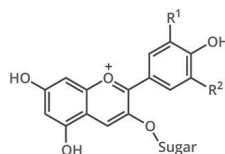
People dye eggs by submerging them in a mixture of dye, water, and vinegar. Acetic acid in the vinegar protonates proteins in the eggshell's cuticle, making portions of it positively charged. This makes it easier for the dye molecules to stick to the egg cuticle, which leads to a more intense color.

### RED



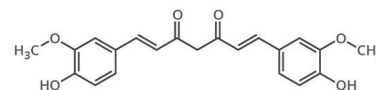
Beetroot juice can dye eggshells red. The color comes from the pigment betanin, shown above.

### BLUE



Anthocyanins, above, give red cabbage its color. They can be used to turn eggshells blue. The sugar and R groups differ between dyes.

### YELLOW



Turmeric mixed with water can be used to turn eggshells yellow. The yellow hue is caused by the compound curcumin (above).



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