

# Periodic graphics

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

More  
online

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

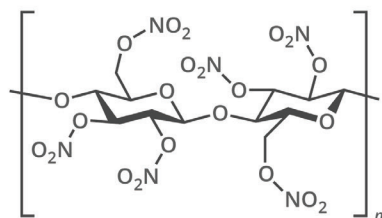
## CHEMISTRY AT THE MOVIES

Later this month, Hollywood will assemble for the 89th Academy Awards. Here's a look at some of the chemistry found in the movie theater, from the film to the popcorn to the audience itself.

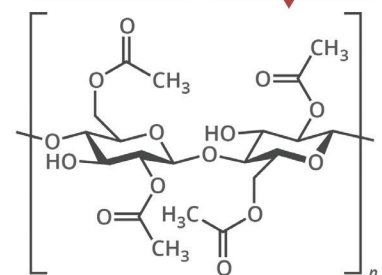
### FILM



Movies were originally shot on nitrocellulose films. But because of their flammability, nitrocellulose films were replaced by cheaper cellulose acetate. Newer polyester films are more stable and stronger, but some filmmakers still use cellulose acetate as motion picture camera negatives because it is easier to splice and edit.



NITROCELLULOSE

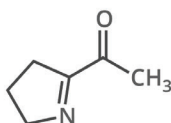


CELLULOSE ACETATE

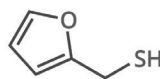
### POPCORN



A number of compounds contribute to popcorn's aroma, including 2-acetyl-1-pyrroline, which has been described as "roasty and popcornlike," and 2-furfurylthiol, which has a coffee-like roasted scent. Aldehyde, pyrazine, and pyridine compounds also contribute.



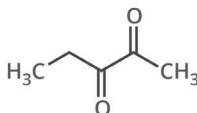
2-ACETYL-1-PYRROLINE



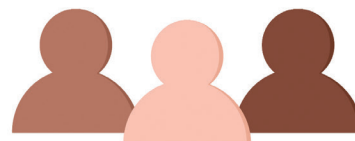
2-FURFURYLTHIOL

Flavorings add to popcorn's alluring aroma. Originally, 2,3-butanedione was responsible for the butter flavor, but the chemical damages the lungs of workers who produce it. 2,3-pentanedione is used as a substitute, but there is evidence it causes similar problems.

2,3-PENTANEDIONE

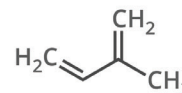


### AUDIENCE

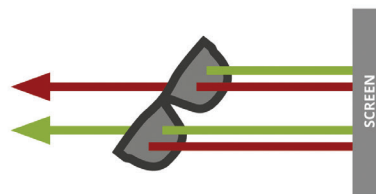


Movies can elicit strong responses from people. Chemists observed one response when they hooked up a mass spectrometer to a cinema's ventilation system to monitor the chemicals produced by people's bodies as they watched a film. During moments of tension, there was a spike in isoprene, which is linked to the synthesis of the stress hormone cortisol.

ISOPRENE



To watch 3-D movies, audiences have to wear special glasses. In some of these glasses, each lens filters out a certain orientation of polarized light (red and green) so each eye sees a slightly different image. The brain combines these images to produce the 3-D effect.



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