

# Periodic graphics

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

More  
online

To see more of Brunning's work, go to [compoundchem.com](http://compoundchem.com). To see all of C&EN's Periodic Graphics, visit [cenm.ag/periodicgraphics](http://cenm.ag/periodicgraphics).

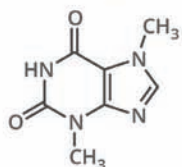
## CHOCOLATE CHEMISTRY

Whether your preference is dark, milk, or white chocolate, here's a handy guide to what's inside!



### DARK CHOCOLATE

COCOA SOLIDS: >35%



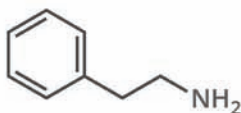
MEDIAN LETHAL DOSE FOR DOGS

**300 mg**

(PER KG OF BODY WEIGHT)

### THEOBROMINE

Dark chocolate has the highest amount of cocoa solids, which remain after cocoa butter is extracted from cacao beans. The solids contain theobromine, toxic to dogs, and phenethylamine, linked to a feel-good effect.

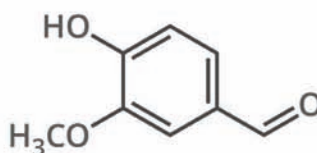


### PHENETHYLAMINE



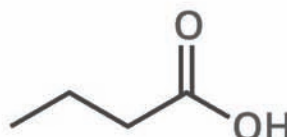
### MILK CHOCOLATE

COCOA SOLIDS: 20-30%



### VANILLIN

Confectioners add vanillin to many milk chocolates to enhance their flavor. American brands of chocolate often contain butyric acid, which adds a sour note to the chocolate's taste.



### BUTYRIC ACID



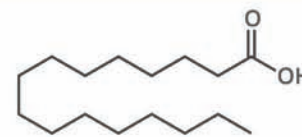
### WHITE CHOCOLATE

COCOA SOLIDS: 0%



### STEARIC ACID

White chocolate does not contain any cocoa solids, only cocoa butter, sugar, and milk. Cocoa butter is composed of a number of fats, mainly stearic acid and palmitic acid.



### PALMITIC ACID



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