

# Periodic Graphics

A collaboration between C&EN and  
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To see more of  
Brunning's work, go to  
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Periodic Graphics, visit  
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## The chemistry of Chinese New Year



Chinese New Year is also known as the Spring Festival, or Chūnjié in Mandarin, and it usually falls on the second new moon after the winter solstice. Here we look at some of the celebration's customs and the chemistry behind them.

### Dumplings



Jiaozi are a type of dumpling traditionally made during Chinese New Year. Jiaozi dough is made from water and flour. Varying the temperature of the water affects the dough's properties, yielding different dumpling wrappers. Near-boiling water denatures flour proteins and gelatinizes starch. This inhibits gluten formation, producing a softer, less elastic dough that's easier to shape. Cooler water encourages gluten formation, creating a harder dough that requires resting before rolling out.

### Starch gelatinization



Starch granules absorb water and swell. The granules leach amylose and eventually rupture as temperature rises, increasing dough stickiness.

### Gluten formation



**Proteins**

Glutenin and gliadin

**Gluten**

A viscoelastic network



### The color red

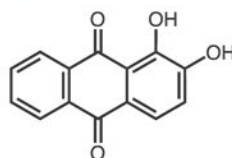
In China, the color red is associated with happiness, success, and good luck, and it is prominent in New Year celebrations. Historically, people in China used the Chinese red pigment (mercuric sulfide) to color murals and ceramics. Because of its toxicity, it's no longer used.



**Mercuric sulfide (HgS)**

Also known as vermilion

People in China also used dyes extracted from safflower and madder roots to color clothes red. Today, people use a range of synthetic dyes instead.



**Alizarin**

Red dye  
obtained from  
madder roots

### Firecrackers

Firecrackers are widely used to celebrate Chinese New Year. The first natural firecrackers were heated bamboo stalks that exploded as air pockets inside them expanded. Later, black powder produced their bang. Today, manufacturers use flash powder for a louder boom.

### Black powder

**75%** Potassium nitrate (oxidizing agent)  $\text{KNO}_3$

**15%** Charcoal (fuel) C

**10%** Sulfur (fuel and stabilizer) S

### Flash powder

**70%** Potassium perchlorate (oxidizing agent)  $\text{KClO}_4$

**30%** Aluminum (fuel) Al



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