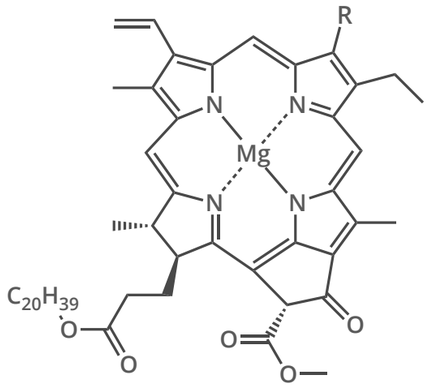
THE CHEMISTRY OF BELL PEPPERS

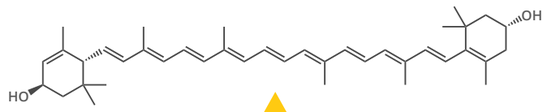
Bell peppers go through a spectrum of colours as they ripen – here we look at the compounds behind their colour, aroma, and flavour.

BELL PEPPER COLOUR CHEMISTRY

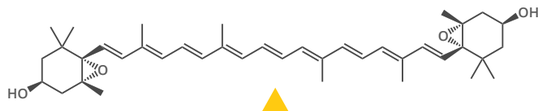


CHLOROPHYLL

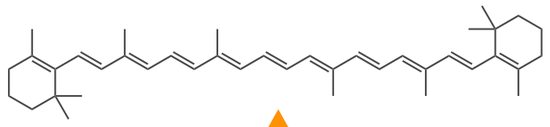
CHLOROPHYLL A: R = $-CH_3$
CHLOROPHYLL B: R = –CHO



LUTEIN

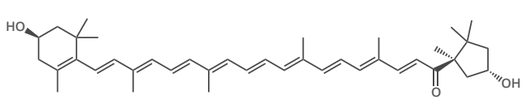


VIOLAXANTHIN

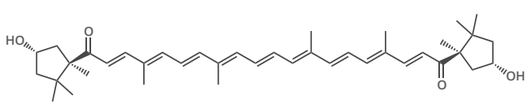


β-CAROTENE

Chlorophyll, used by plants for photosynthesis, gives bell peppers their initial green colour. As the pepper ripens, these are decomposed, and a range of carotenoid pigments appear. These include lutein, violaxanthin, and beta-carotene, which give yellow and orange hues. Eventually red carotenoid pigments including capsanthin and capsorubin appear. These red pigments are almost exclusively found in peppers.

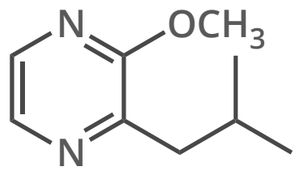


CAPSANTHIN

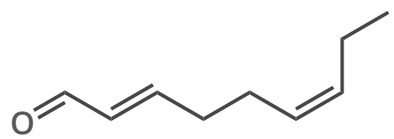


CAPSORUBIN

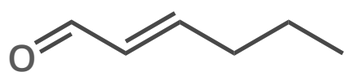
BELL PEPPER AROMA



BELL PEPPER PYRAZINE



CUCUMBER ALDEHYDE



(E)-2-HEXENAL

The aroma of bell peppers also develops as they ripen. In green peppers, the characteristic smell is largely due to a single chemical, 2-methoxy-3-isobutylpyrazine ("bell pepper pyrazine"). Other minor contributors include (E,Z)-2,6-nonadienal ("cucumber aldehyde"). The concentrations of most volatile compounds drop during ripening, with the exception of (E)-2-hexenal and (E)-2-hexenol, lending a sweeter, fruitier note to the aroma.