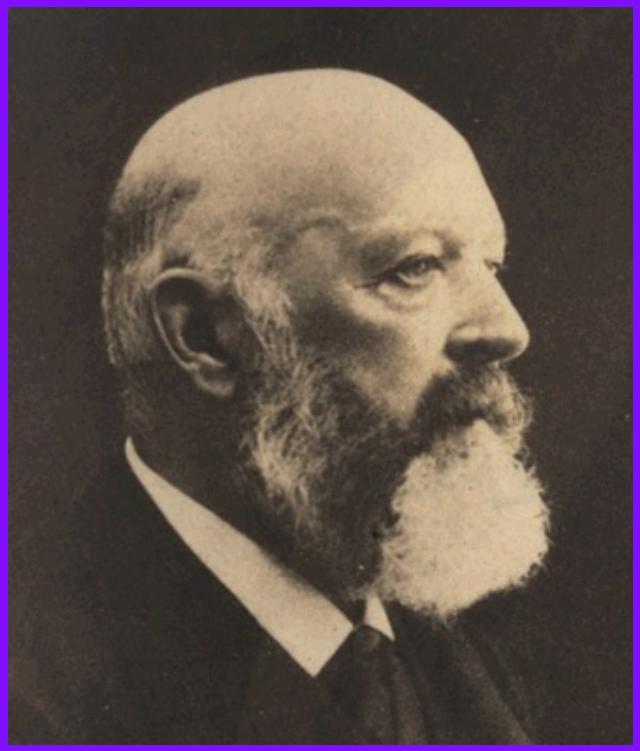
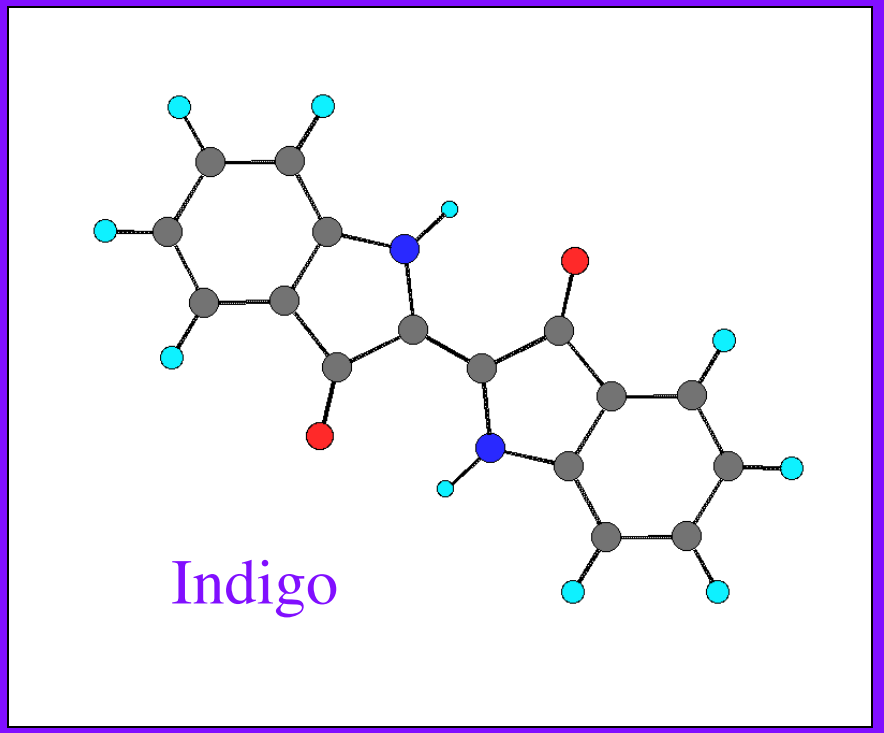


Wilhelm Adolph von Baeyer
(1835-1917)
Nobel Prize -1905



But, When It Came to Cycloalkanes,
Baeyer Got It Wrong

Historical Background

1858 - Kekule and Couper -Tetravalence of Carbon

1874 - van't Hoff and LeBel - Tetrahedral Carbon

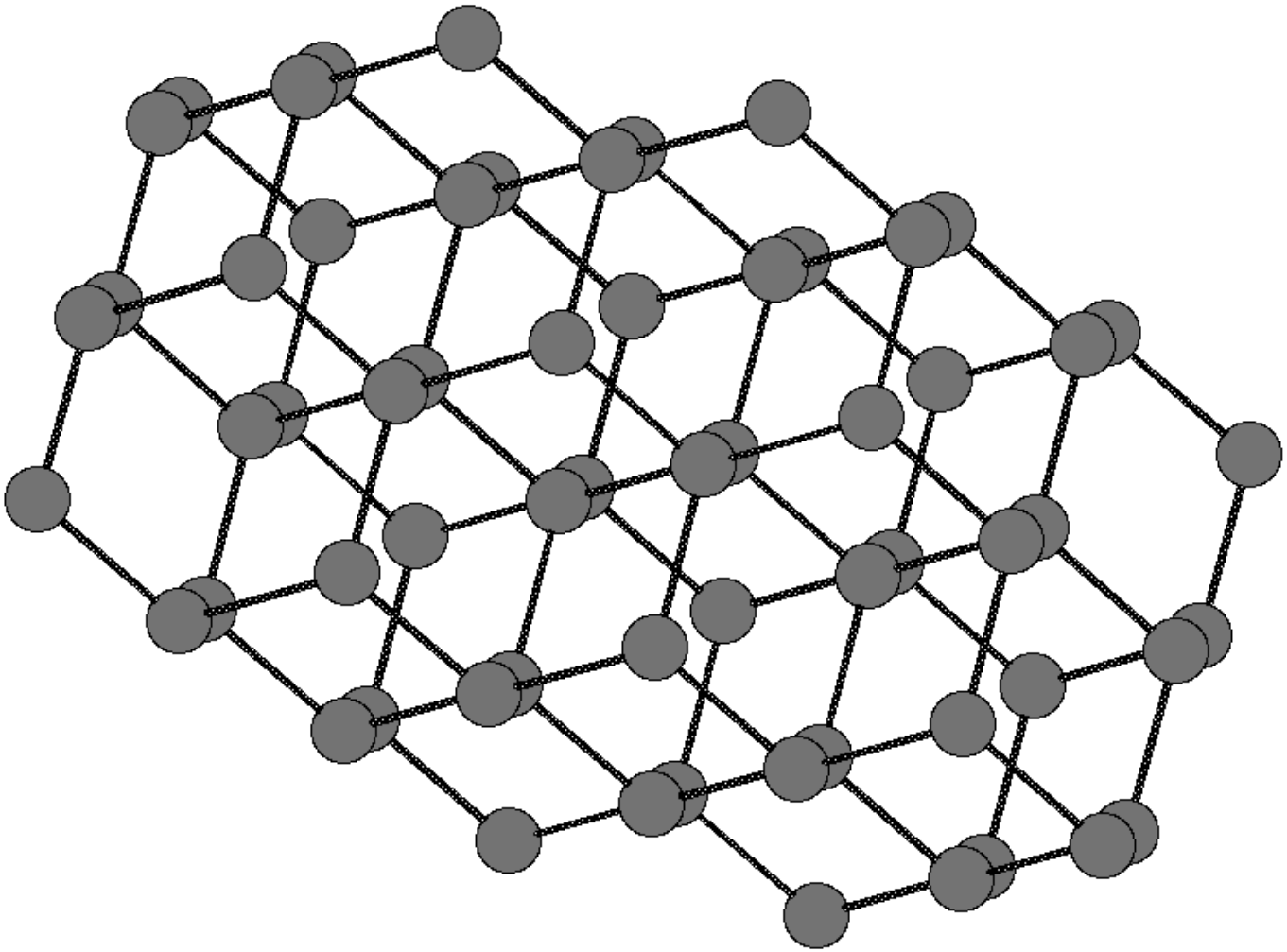
1885- Baeyer - Planar Cycloalkanes

- Polymethylene compounds (cycloalkanes) are strained.
- Since only one cyclohexane carboxylic acid is known, they must be planar.
- Cyclopentane is the least strained of the cycloalkanes.

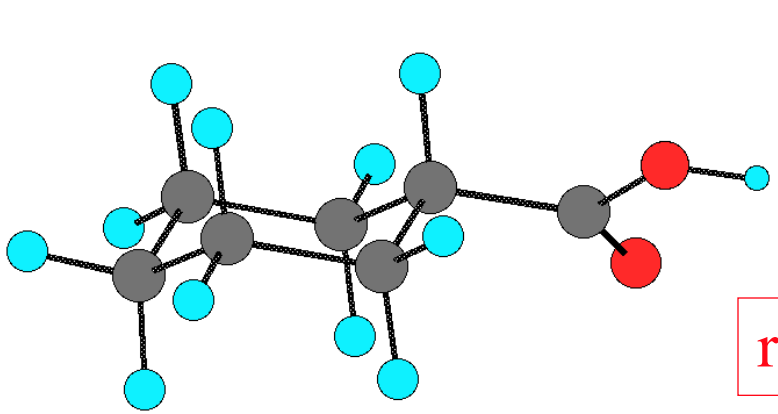
1890 - Sachse - Strain need not exist in larger rings.

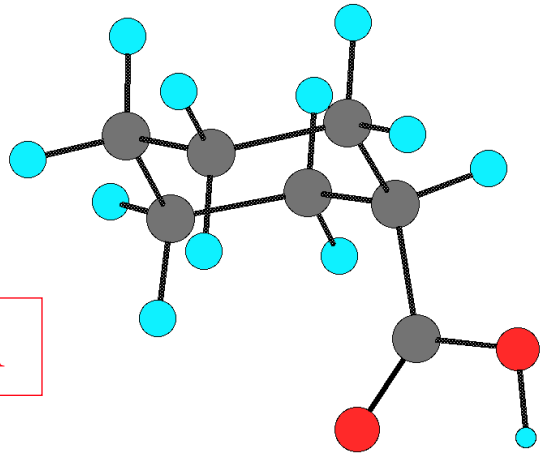
1918 - Mohr - x-ray analysis of diamond

Diamond Lattice

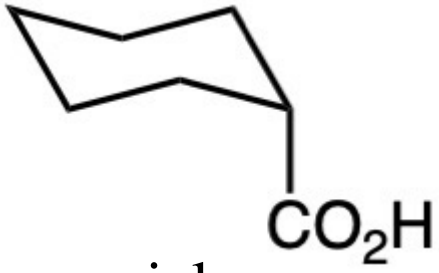


"There is only one Cyclohexanecarboxylic Acid"





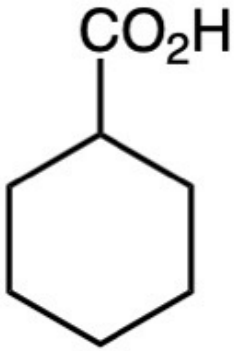
rapid equilibrium



equatorial

axial

Cyclohexane is not
a regular, planar hexagon.



Baeyer's Analysis (1885)

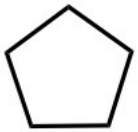
- The sum (n) of the supplementary angles of any polygon is 360°.
- The interior angle of a regular polygon = 180°-(360/n).

least strained →

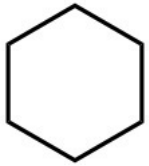
$(109.5^{o} - 0^{o})/2 = 54.75$

$(109.5^{o} - 60^{o})/2 = 24.75$

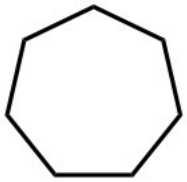
$(109.5^{o} - 90^{o})/2 = 9.75$



$(109.5^{o} - 108^{o})/2 = 0.75$



$(109.5^{o} - 120^{o})/2 = -5.25$



$(109.5^{o} - 128.6^{o})/2 = -9.55$