Colorimetric Sensor Array

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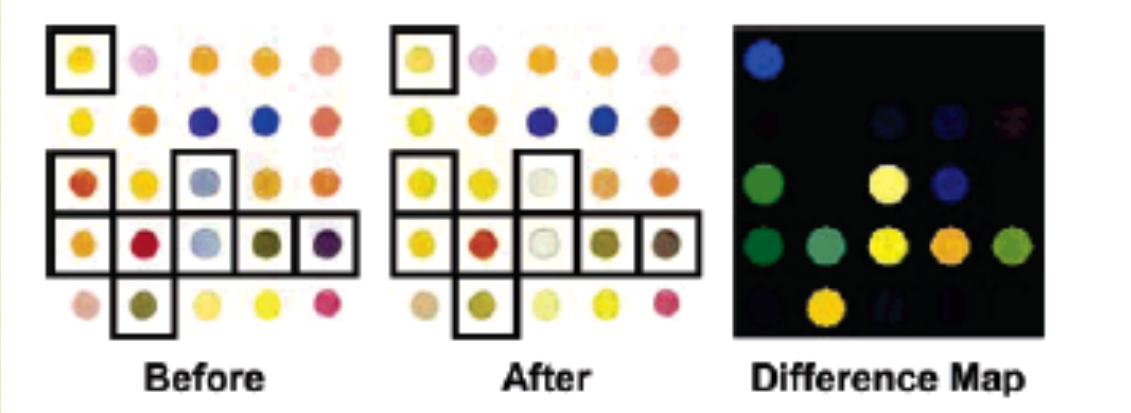
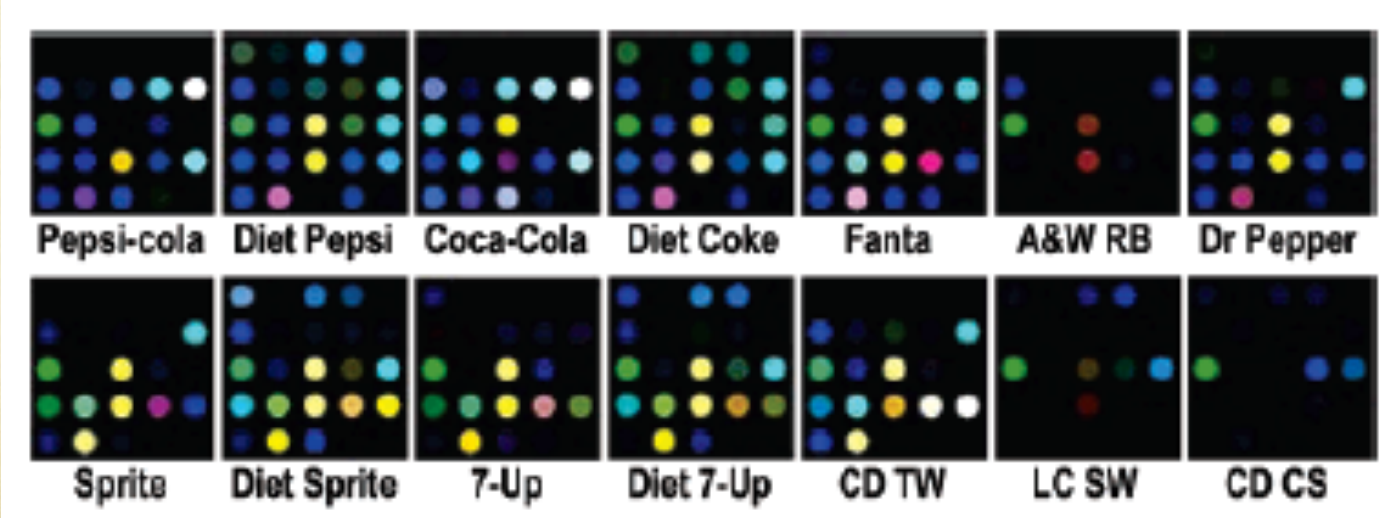
Sensor Array

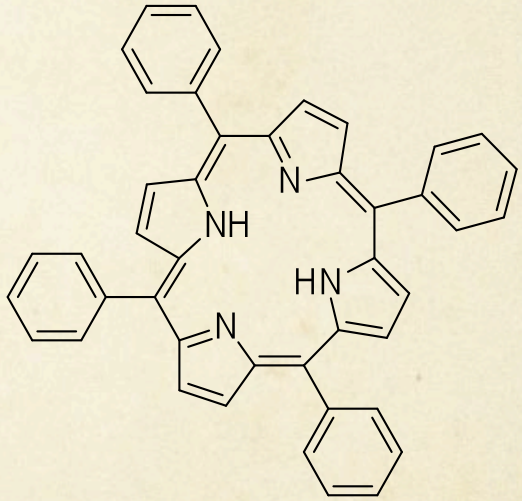




5,10,15,20-Tetraphenylporphyrin

General Information

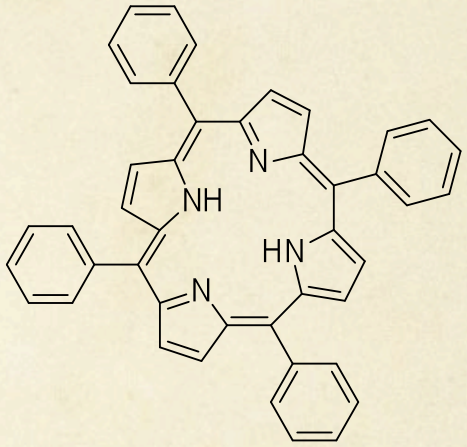
- Also called meso-tetraphenylporphyrin
- Abbreviated H_2TPP
  - TPP^{2-} when complexing
- Synthetic heterocyclic macrocycle
  - Many natural analogs
- Extended aromatic compound
  - Very robust



Legin et al. Cross-sensitive chemical sensors based on tetraphenylporphyrin and phthalocyanine. *Anal. Chim. Acta*. **2002**, *457*, 297-303.
Paolesse et al. Chemical images by porphyrin arrays of sensors. *Microchim. Acta*. **2008**, *163*, 103-112.

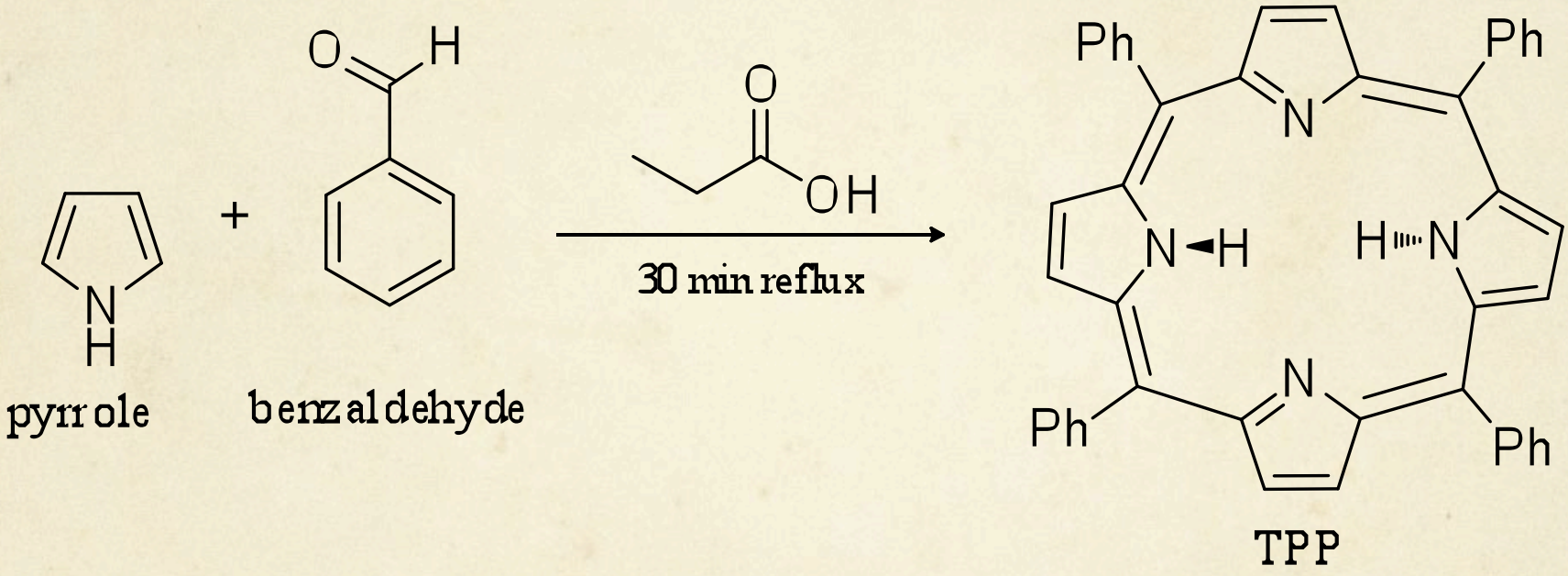
General Information

- Converted into a metal complex by replacing the two central hydrogen atoms with a transition metal cation
- Used in colorimetric sensor arrays
  - Color changes induced upon ligating metal cation
- Deposited onto electrode surfaces to form potentiometric sensor arrays
- Safe to handle

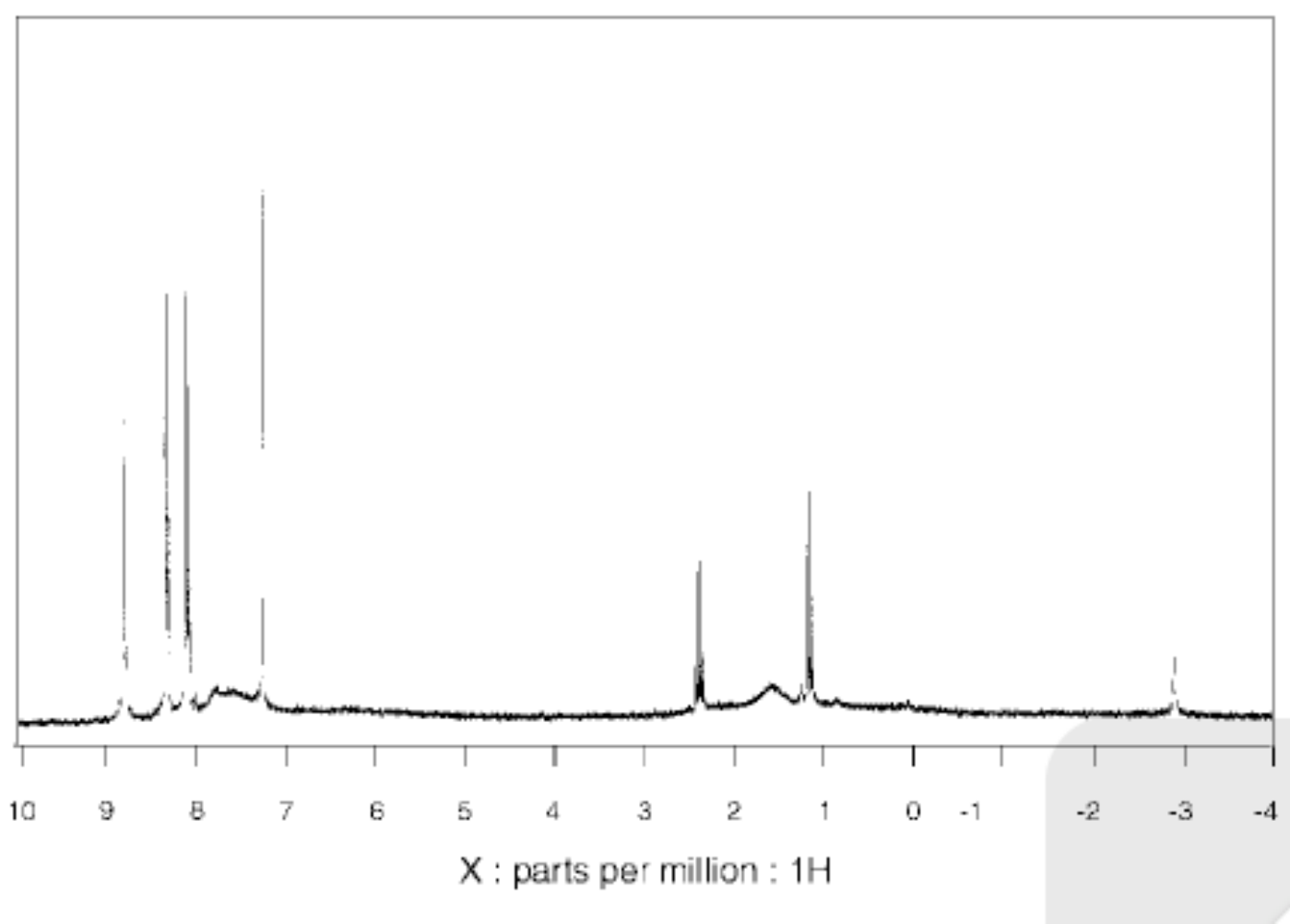


Paolesse et al. Chemical images by porphyrin arrays of sensors. *Microchim. Acta*. **2008**, *163*, 103-112.
Rakow, Neal and Kenneth Suslick. A colorimetric sensor array for odour visualization. *Nature*. **2000**, *406*, 710-713.

Synthesis

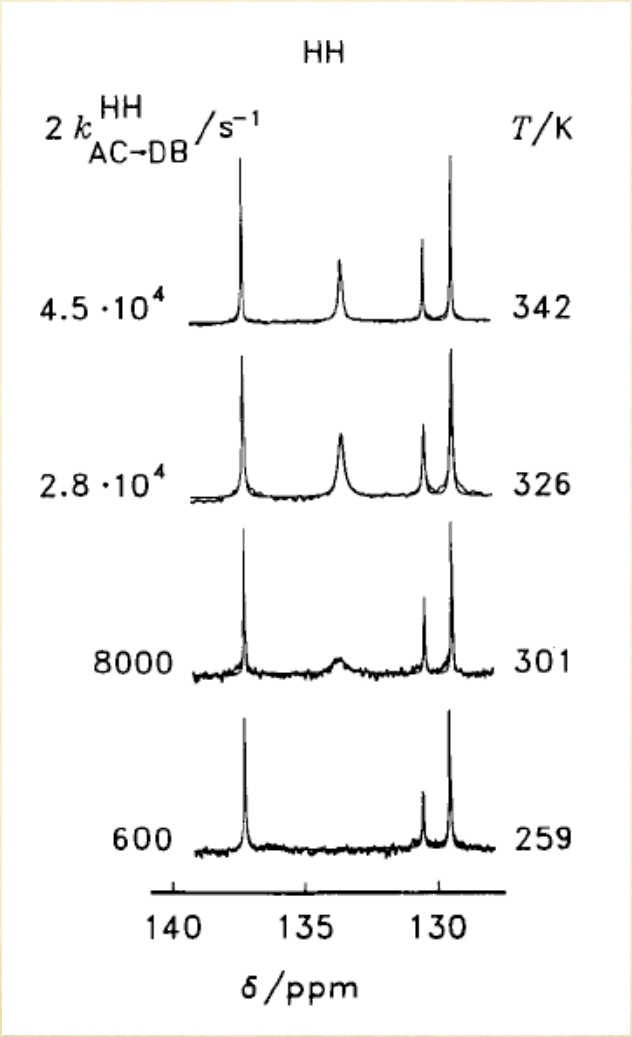

O
H
O
OH
N
H
+
30 min reflux
Ph
Ph
N
N
H
H
N
N
Ph
Ph
pyrrole
benzaldehyde
TPP

^{1}H NMR Spectrum of Meso-Tetraphenylporphyrin



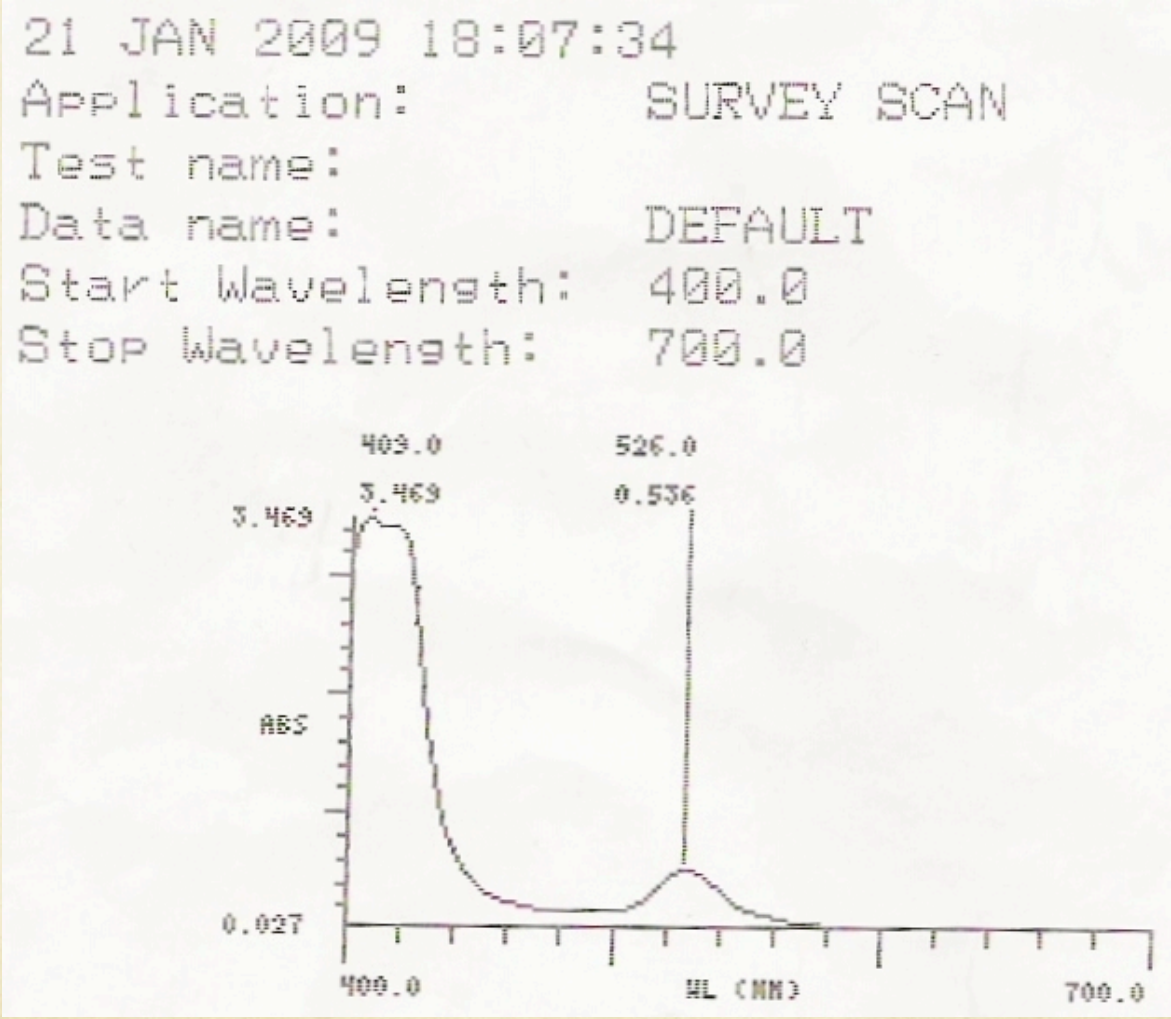
Falvo, R.; Mink, L. Microscale Synthesis and ^{1}H NMR Analysis of Tetraphenylporphyrins. *J. Chem. Ed.*, **1999**, *76*, 238.

^{13}C NMR Spectrum of Meso-Tetraphenylporphyrin



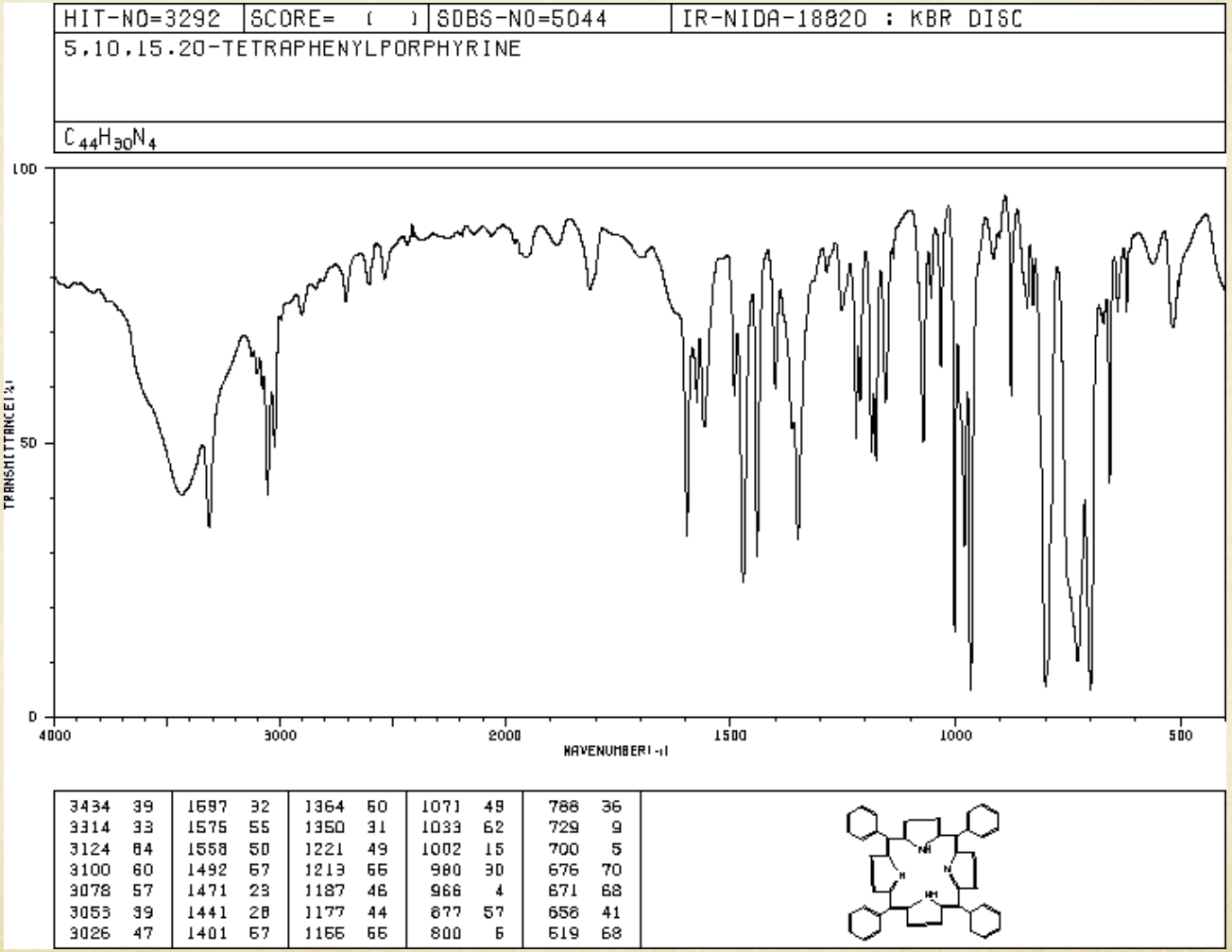
Schlabach, M.; Wehrle B.; Rumpel, H.; Braun, J.; Scherer, G.; Limbach, H. NMR and NIR Studies of the Tautomerism of 5,10,15,20-Tetraphenylporphyrin including Kinetic HH/HD/DD Isotope and Solid State Effects. *Ber. Bunsenges. Phys. Chem.,* **1992**, *96*, 824.

UV/Vis Spectrum of Meso-Tetraphenylporphyrin



File: Meso-Tetraphenylporphyrin UV-vis.JPG. http://en.wikipedia.org/wiki/File:Meso-tetraphenylporphyrin_UV-vis.JPG (accessed February 28, 2010).

IR Spectrum of Meso-Tetraphenylporphyrin



Spectral Database for Organic Compounds. http://riodb01.ibase.aist.go.jp/sdbs/cgi-bin/direct_frame_top.cgi (accessed February 28, 2011).