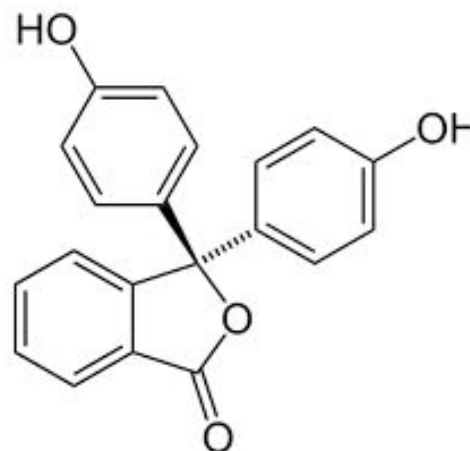


# PHENOLPHTHALEIN

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Michelle Lukosi  
Kasey Royer



# Phenolphthalein

- $C_{20}H_{14}O_4$ <sup>1</sup>
- 318.32 grams/mol
- 3,3-bis(p-hydroxyphenyl)phthalide<sup>2</sup>
  - Synonyms: Brooklax and 3,3-bis(4-Hydroxyphenyl)-3H-isobenzofuran-1-one

<sup>1</sup> Dice, David. Phenolphthalein. 2008. 1-2. <http://digipac.ca/chemical/equilibrium/phenolphthalein.htm>

<sup>2</sup> Spectral Database for Organic Compounds. *National Institute of Advanced Industrial Science and Technology*. SDBS #1696. [http://riodb01.ibase.aist.go.jp/sdbs/cgi-bin/direct\\_frame\\_top.cgi](http://riodb01.ibase.aist.go.jp/sdbs/cgi-bin/direct_frame_top.cgi)

# Common Uses

- Laxative<sup>3</sup>
  - Carcinogenic effects
- Kastle-Meyer blood test<sup>4</sup>
  - Postive→pink
- Toys<sup>5</sup>
  - Disappearing ink
  - Hollywood Barbie
- Concrete business<sup>6</sup>

<sup>3</sup> Phenolphthalein. *National Science Digital Library* **2009**.

<http://www.reciprocalnet.org/recipnet/showsamplebasic.jsp?sampleId=27344375>

<sup>4</sup> Tice, Rr et al. Measurement of Micronucleated Erythrocytes and DNA damage during chronic ingestion of phenolphthalein in transgenic female mice heterozygous for the p53 gene. *Environmental and molecular mutagenesis* **1998**, 31, 113–24.

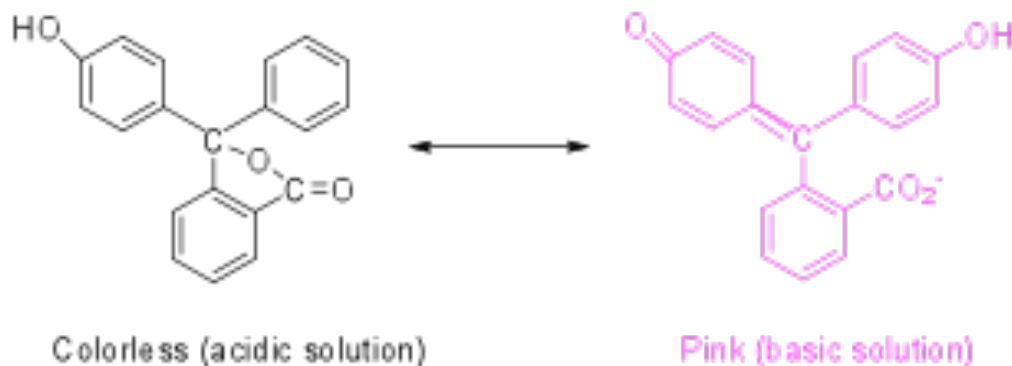
<sup>5</sup> Katz, David. Lightsticks, Magic Sand, Magic Rocks, Liquid Crystals, Dissolving Paper, Disappearing Ink, Flammables, and Big Bang Cannons. *Chemistry In the Toystore* **2002**, 6, 9.

<sup>6</sup> De Bievre, Paul. Acid-Base Titrations. *Titration.info*. <http://www.titrations.info/acid-base-titration-indicators>

# Main Use

- pH Indicator

- The most commonly used acid-base indicator<sup>7</sup>
- End-point determination
- Colorless in acidic solutions; pink in basic solutions<sup>8</sup>

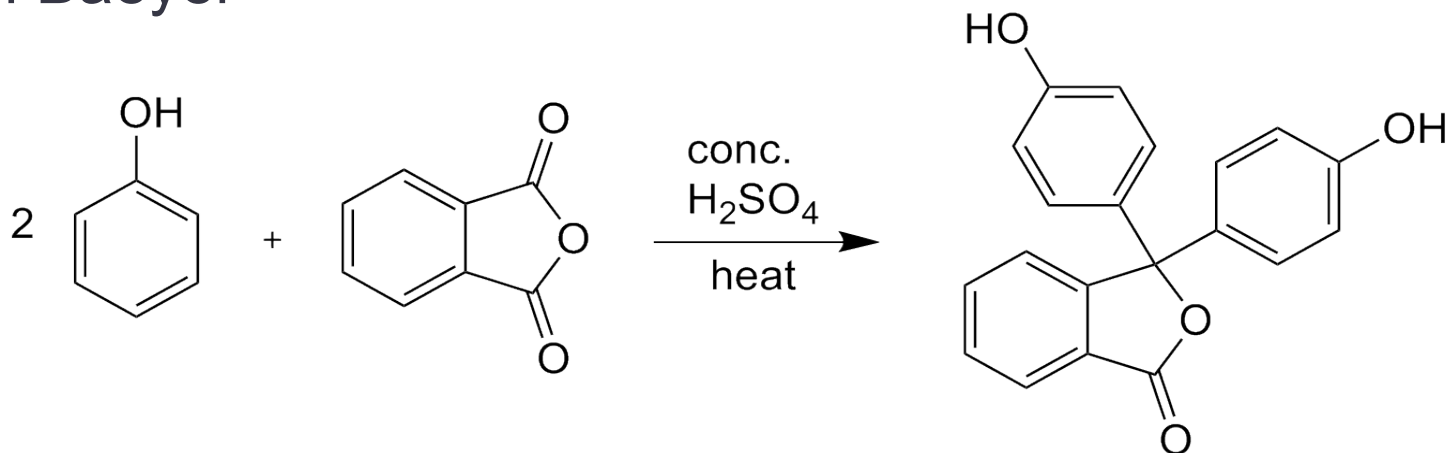


<sup>7</sup> Dice, David. Phenolphthalein. **2008**. 1-2. <http://digipac.ca/chemical/equilibrium/phenolphthalein.htm>

<sup>8</sup> Kuwabara, Tetsuo et al. Phenolphthalein-Modified  $\beta$ -Cyclodextrin as a Molecule-Responsive Colorless-to-Color Change Indicator. *JOC* **1998**, 63, 8729–8735.  
<http://pubs.acs.org/doi/full/10.1021/jo980613i?prevSearch=%2528Phenolphthalein%2529%2BNOT%2B%255Batype%253A%2Bad%255D%2BNOT%2B%255Batype%253A%2Bacs-toc%255D&searchHistoryKey=%29>

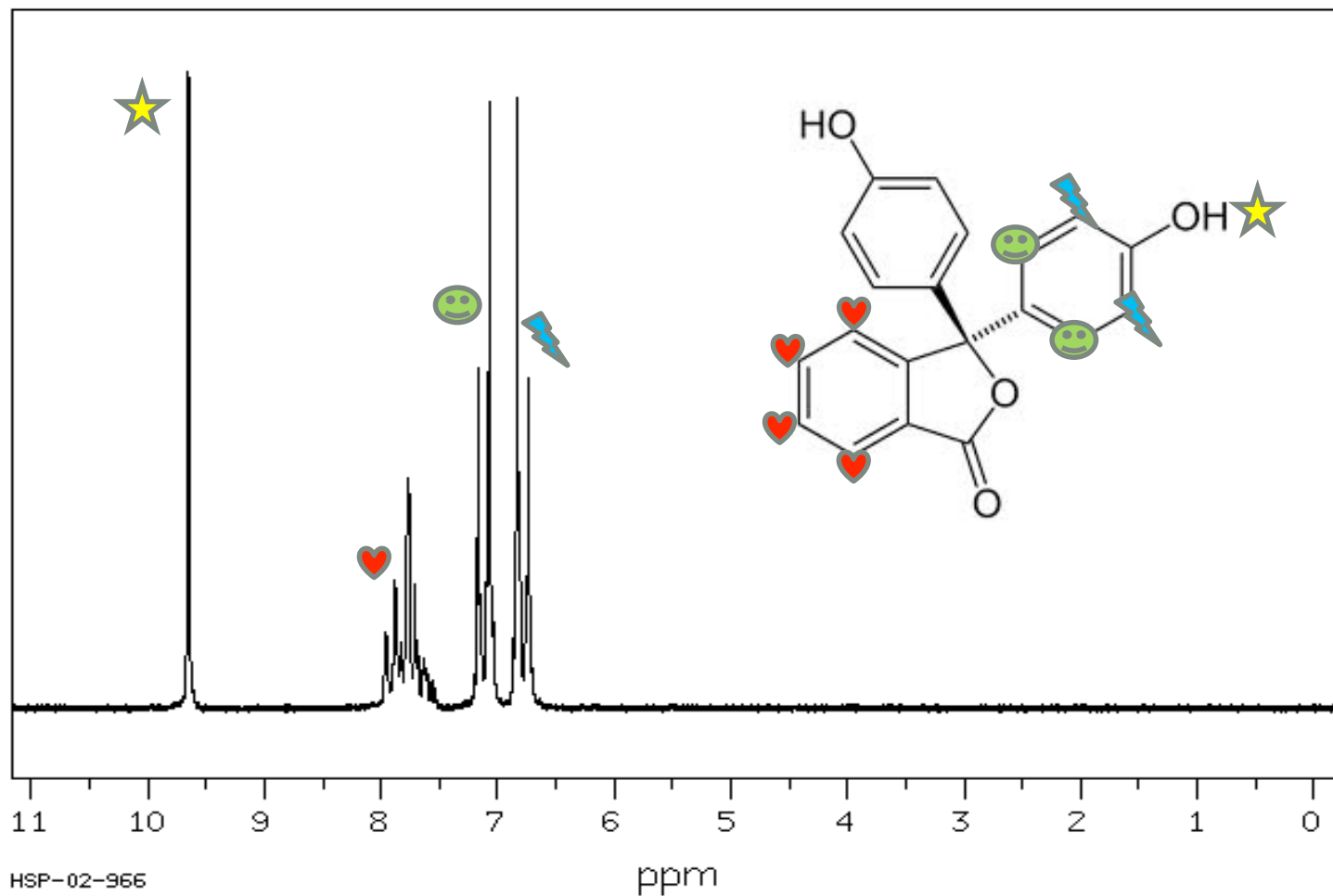
# Synthesis

- Condensation of phthalic anhydride combined with two equivalents of phenol under acidic conditions (using concentrated hydrochloric acid and heat)
- Synthesis was discovered by the German chemist Adolf von Baeyer<sup>9</sup>



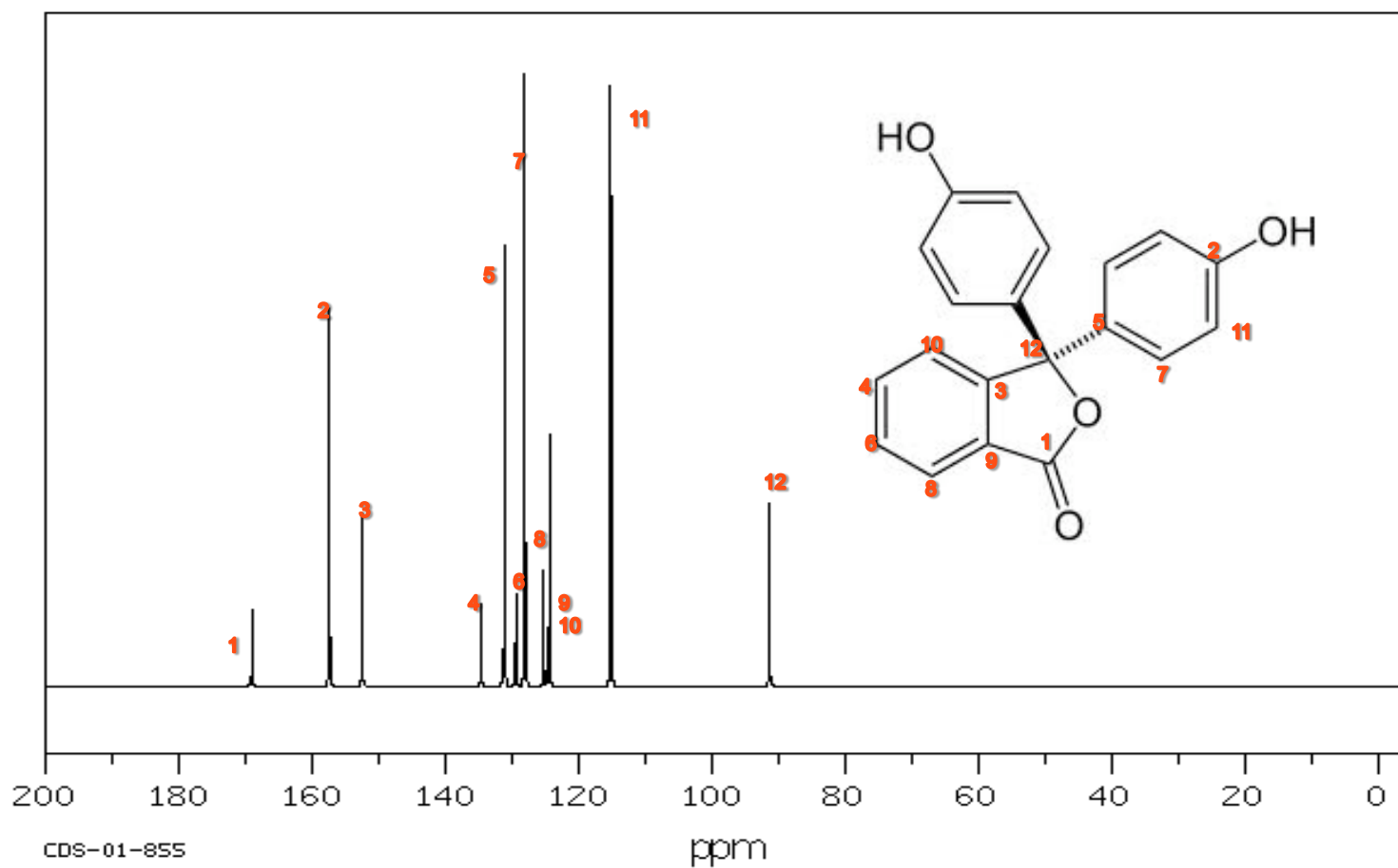
<sup>9</sup>Brewer, Charles Edward. On the Constitution of galleïn and coeruleïn. *The Chemical Publishing Company* 1900.  
<http://books.google.com/books?hl=en&lr=&id=N1FKAAAAMAAJ&oi=fnd&pg=PA4&dq=synthesis+of+phenolphthalein+with+hydrochloric+acid+%22synthesis+of+phenolphthalein%22&ots=5TnXC8RGeM&sig=by4AlpdFeN5J2hgRrXETRE5h2VM#v=onepage&q&f=false>

# H<sup>1</sup> NMR



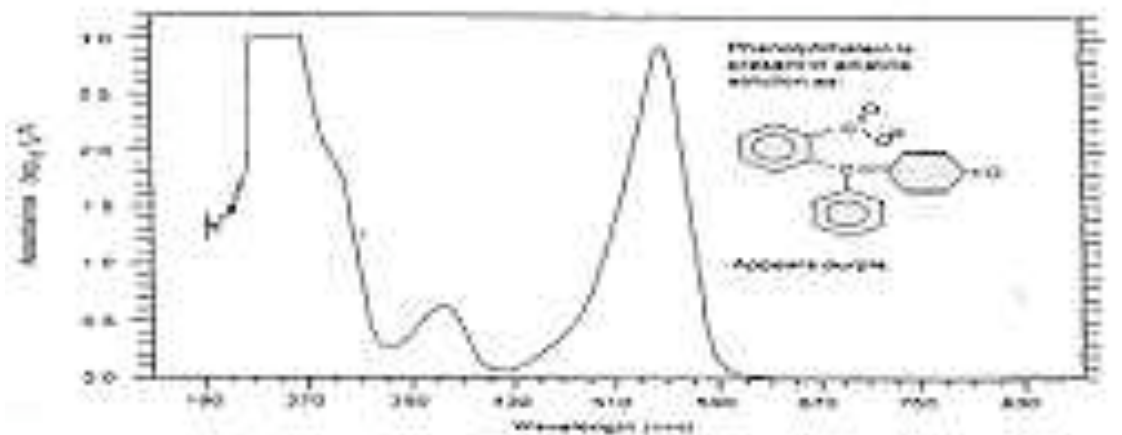
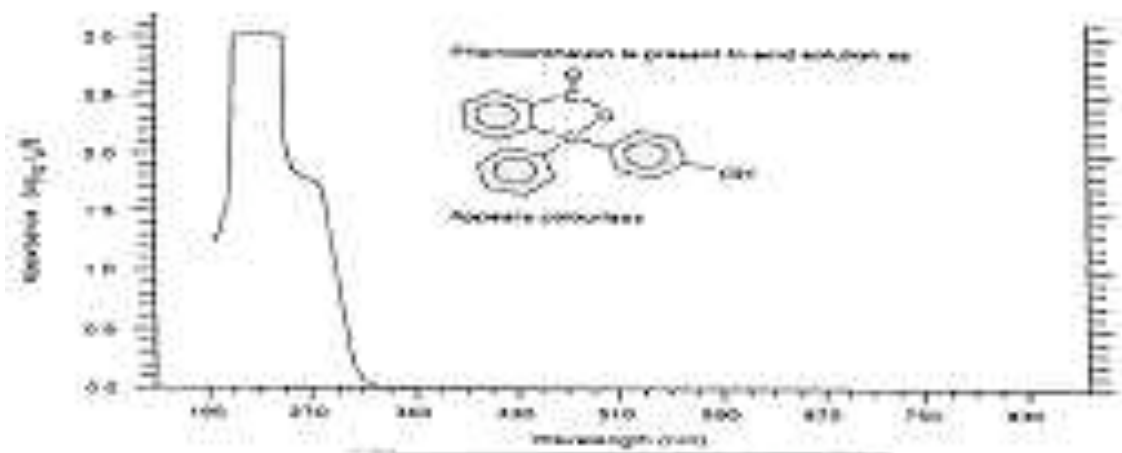
<sup>10</sup> Spectral Database for Organic Compounds. *National Institute of Advanced Industrial Science and Technology*.  
SDBS #1696. [http://riodb01.ibase.aist.go.jp/sdbs/cgi-bin/direct\\_frame\\_top.cgi](http://riodb01.ibase.aist.go.jp/sdbs/cgi-bin/direct_frame_top.cgi)

# C<sup>13</sup> NMR



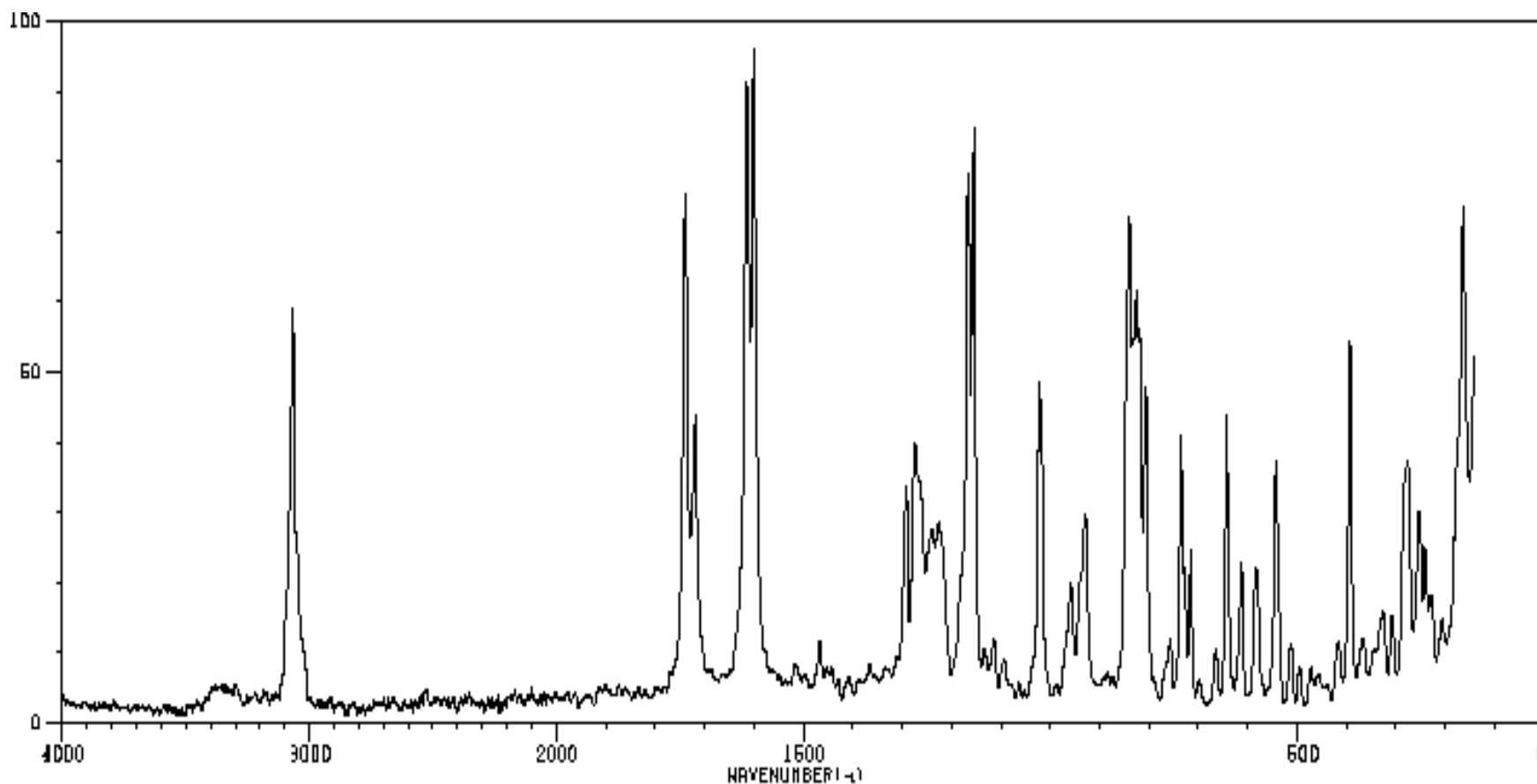
<sup>10</sup> Spectral Database for Organic Compounds. *National Institute of Advanced Industrial Science and Technology*.  
SDBS #1696. [http://riodb01.ibase.aist.go.jp/sdbs/cgi-bin/direct\\_frame\\_top.cgi](http://riodb01.ibase.aist.go.jp/sdbs/cgi-bin/direct_frame_top.cgi)

# Visible Light Spectrum





# Raman Spectrum



<sup>10</sup> Spectral Database for Organic Compounds. *National Institute of Advanced Industrial Science and Technology*.  
SDBS #1696. [http://riodb01.ibase.aist.go.jp/sdbs/cgi-bin/direct\\_frame\\_top.cgi](http://riodb01.ibase.aist.go.jp/sdbs/cgi-bin/direct_frame_top.cgi)