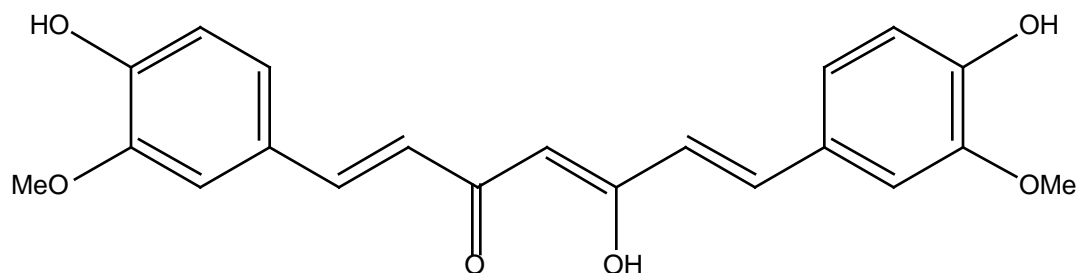


## Chemistry 416, Dr. Glaser

### Applications of UV/Vis Spectra: Photometric Determination of Boron with Curcumin

The photometric determination of elements by means of complexing agents is a very powerful tool in trace analysis that can be applied to metals and non-metals. A particularly interesting method is based on the intensive color occurring in chelates due to the stabilization of a particular ligand structure where the complexed element has no influence upon the position and intensity of the spectrum. The photometric determination of boron with curcumin is an example.

Curcumin



Curcumin is the enol of a 1,3-diketone. Upon protonation in acidic media, a species is obtained that shows continuous conjugation with charge resonance. This form absorbs at  $18,020\text{ cm}^{-1}$  (what is this in nm?) with  $\epsilon_{\text{max}} = 73,000\text{ l mol}^{-1}\text{ cm}^{-1}$ . Draw the structure of the protonated species with all pertinent resonance forms.

The enolic OH groups are selective for boron (in the form  $\text{H}_2\text{BO}_3$ ). The complex formed between curcumin and boronic acid shows the same absorption as does curcumin itself in acid solution but the intensity is just about twice as large. Suggest a structure for the complex.

D. Thierig, F. Umland *Z. Analyt. Chem.* **1960**, 211, 161.