Interpreting the d6 Tanabe-Sugano diagram

The UV-Vis spectrum of a 0.0081 M solution of [Co(en)3]I3 is shown below. You will need a copy of the d6 Tanabe-Sugano diagram (<https://en.wikipedia.org/wiki/Tanabe–Sugano_diagram>).

A graph of a red line

AI-generated content may be incorrect.

1. What are the molar absorptivities of the absorptions at 330 and 466 nm?
2. Based on the e values, are these d-d transitions?
3. Is this a high-spin d6 or a low-spin d6 complex? How do you know?
4. What are the energies of the two bands in wavenumbers? What is their ratio (greater than one)?
5. Let’s determine ∆o for Co(en)33+. If you did part c correctly, you should find that the ratio of the two absorptions is 1.41, and the value where this holds is ∆o/B ~ 39
   1. What are the E/B values for the two lowest energy transitions (1A1g to 1T1g and 1A1g to 1T2g) when ∆o/B = 39?
   2. Use these values to determine B for each transition (to make sure you do the math correctly, E1 is 30,300 cm-1 and E2 is 21,500 cm-1).
   3. What is the average B value?
   4. Use this B value to determine ∆o