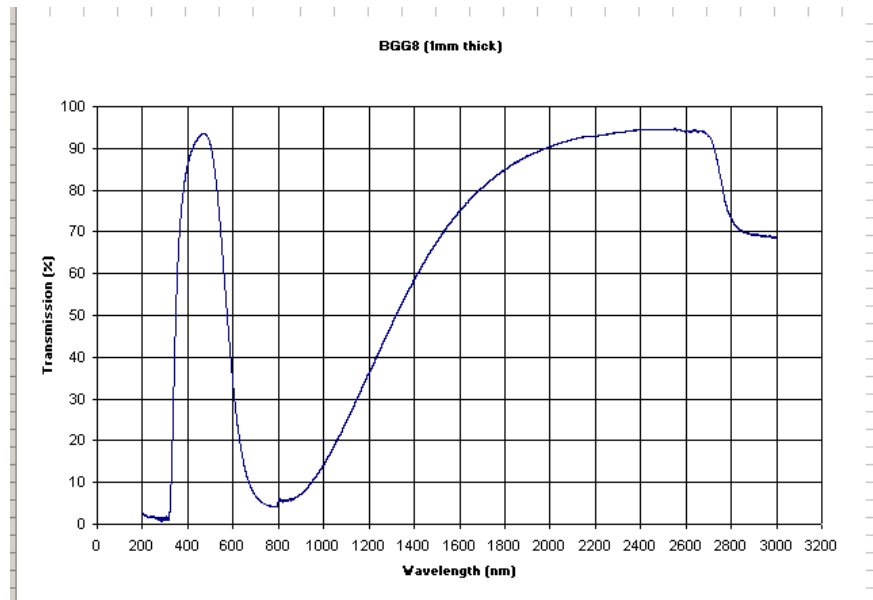


There are two pages to Quiz 2 and it is due at noon on Thursday October 17. It is open book, but no discussion or help about this quiz from any person is acceptable- this is independent work. Please print the pdf and complete the quiz on the hardcopy. Place numerical answers in the space provided with the proper units and significant figures given on this copy. Show all work for questions where calculations are required (i.e., provide formulas, substitutions, etc.). If you have questions on clarifications, please e-mail or ask Chris.

1. The transmittance profile below for a glass blue green filter (BGG8) is given on the vendor's web page at Phila-Optics, Inc. (<http://www.philaoptics.com/default.asp> accessed 10/12/19):



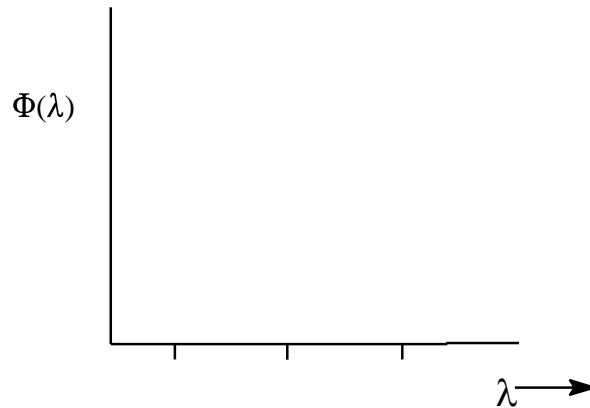
a. Would this filter be a suitable wavelength selection device for an analysis wavelength of 425 nm? Briefly explain why or why not.

b. What is the absorbance value for this filter at 400 nm? Show work. _____ AU

2. a) If the reciprocal dispersion for a grating in a monochromator is rated at 8 nm/mm and the exit slit on the monochromator is 200 μm , what is the spectral bandpass, s , for this configuration?

$$s = \underline{\hspace{2cm}} \text{ nm}$$

- b) Sketch the triangular slit function that the detector sees for the system in part a above when the monochromator is set to a wavelength of 700 nm (draw roughly to scale on diagram below). Label s , λ_{0+s} and λ_{0-s} with symbols and nm values using the diagram below (give nm values on the diagram).



- c) What is the minimum slit width you would need to use with this monochromator configuration to resolve the two atomic Hg lines with maxima of 404.7 nm and 407.8 nm? (give W to 3 significant figures)

$$W = \underline{\hspace{2cm}} \mu\text{m}$$

3. Can you use the OOI USB 2000 CCD detector at your station to baseline resolve the two atomic Hg lines given in 2c above if you used an integration of 5 ms, averages set to 20, and a boxcar of 0? Yes or No (circle one). Show your work in deciding this answer.