Absorption and Emission - General Knowledge

These questions have been designed to ensure that the users understand the principles of operation, that the instruments are not damaged, that they used safely, and that the data collected is valid. Read and understand the manual before you answer these questions. The important point is for each user to know the answer to each of these questions. Therefore, if you cannot find an answer in the manuals, please ask the person responsible for the instrument. Please ask the person in charge for a copy of the manual. The original must NEVER leave the room.

Absorption

(1) What are the major components of our HP system? Draw the layout of the instrument.

(2) What kind of detector does the instrument have? How is the data collected? How is this different than a scanning instrument?

(3) What is(are) the light source(s) and wavelength range? What is the typical lifetime of the source(s)? While performing a routine experiment, what might be a sign that the lamp(s) need to be changed?

(4) What performance test should be performed if you suspect that the lamp(s) need to be replaced? How is it performed?

(5) Why does one need to collect a background spectrum? How should the background be collected? How often?

(6) How is the background used by the instrument to arrive at the absorption?

(7) What is the wavelength range of the instrument? What is the error in the wavelength? What gives rise to these limits?

(8) What is the highest reliable absorbance that the instrument can measure? What makes the instrument unreliable above this absorbance? What gives rise to this limit?

(9) What system is used for temperature control of the sample? What is the temperature range possible? How much does this temperature control system cost?

(10) What are the two materials that absorption cells are typically made of? What is the difference in properties and price between them? Why should you never touch the cell surface with your fingers?

Emission

(1) Draw the layout of the instrument labeling the important components.

(2) What type of light source and detector are in the instrument?

(3) What is an excitation spectrum? Why is it important? When should it be run?

(4) For an emission spectrum, how should the excitation wavelength be selected? Typically, what should be the maximum absorbance of your sample at the excitation wavelength? Why is this important?

(5) What parameter(s) of the instrument controls the bandwidth of the excitation and emission light? Why are these important?

(6) What is the purpose of using glass filters? What kind do we usually use? Where are they placed in the instrument?

(7) For the following parameters, indicate the typical values used, how one chooses the optimal value for a given sample, and how these parameters affect the signal.

(a) Slit width

(b) Scan rate

(c) Integration time

(8) Why do emission spectra need to be corrected? Where does the correction file come from?

(9) Why do excitation spectra need to be corrected? Where does the correction file come from?

(10) Why should the instrument be turned off when the lamp is switched on?

(11) In some cases emission samples need to be deoxygenated. Why? How can you check whether your sample needs to be deoxygenated? How can you deoxygenate your sample?

(12) How should you choose the scan range for emission and excitation?

(13) What is the maximum counts that you should use for emission? Why is this a limit? How can this be easily adjusted?

(14) Is Raman scattering typically present in any spectrum? Where is it usually found? What can you do to remove of minimize the observed signal from Raman scattering if you are trying to measure an emission spectrum?

(15) What is a typical test to check lamp intensity and calibration of the instrument?

(16) Why is it important to sign the log book?