PES 315 Modern Physics Lab Fall 2004

ABSTRACTS

Writing abstracts is an important skill. It requires you to communicate your work in a very concise and precise manner. It should convey why you did the experiment, perhaps a little on how you did it, and should include major results (numbers and observations). The abstract is NOT an introduction to your report and is NOT just a summary where you assume that the reader has already seen the report. Abstracts are a separate document which contains (in 200 words or less) all of the critical information of the report. Anything reported in the abstract should, however, also appear somewhere in the body of the report. I often find it best to write the abstract last, after I have finished the rest of the report.

The following abstracts are for a spectrophotometer experiment where various materials (liquids and thin solids) were placed over a spectrum to study the absorption (or transmission) of light in these materials at different wavelengths. Read them. Do you understand what the student did and what the results were ? Some students did slightly different experiments than others.

1. As the concentration of a dye in a solution is increased, the percent transmission is decreased as predicted by Beer's law. Also, the light transmitted through a filter is, for the most part, at the same wavelength as the filter's color. These observations can be useful in understanding material analysis using a spectrophotometer.

short (53 words)

How was experiment done?

Any important quantitative results?

Good qualitative observations
Some motivation

2. Light waves, when incident on transparent substances, either solid or liquid, will partly be reflected, absorbed, or transmitted. Bouguer's Law, which deals with solid transparent material, says the amount of light that is transmitted through the b^{th} layer is equal to the transmittance for one layer, raised to the b^{th} power. Similarly Beer's Law, which deals with transparent solutions, states that the transmittance of light through the b^{th} unit of solution is equal to the transmittance for one unit, raised to the b^{th} power.
Using a spectrophotometer to experimentally verify both laws, we came within 2.9% of duplicating Bouguer's law, and 5.6% of replicating Beer's law. This error, while partly attributable to method, can also be traced to slight inadequacies in both theories. Bouguer's law ignores light reflected between layers, and Beer's law neglects light scattered back from inside higher concentrated solutions. Experimental transmittance, then, for Bouguer's law is higher than that predicted by

length fine (about 163 words)

<--- motivation

<--- theory

<--- results

<--- discussion

3. Bouguer's law was investigated by placing colored filters in a spectrophotometer and measuring the transmittance for various thicknesses of the filter. Beer's law was investigated by placing a solution in a spectrophotometer and measuring the transmittance for various concentration of the solution.

Very short (44 words)

method is fine

What are these laws?
Any results or conclusions?
Why is this important?

4. We used a spectrophotometer to verify Bouguer's law for solid and liquid light filters. Bouguer's Law says that transmittance drops off exponentially with the thickness of solid filters, and with particulate concentration in liquids. The decay parameter, α, was measured at 0.0796 for a solid red filter (overhead transparency). For four colors of food coloring, the α's were as follows: red: 0.41, yellow: 0.38, green: 5.79, blue: 3.84. The graphs used to calculate the α's also showed signs of saturation; their slopes began decreasing with the number of filters and with concentration, indicating that Bouguer's Law does not hold for very thick, or very concentrated filters.

length (about 110 words)
method in first sentence

<--- theory

<--- results

What do the numbers mean?

<--- observation

Remember an abstract is often the only thing anyone will read about your work. It must convey to them the important message that you have. One problem that often arises is that the experimenter really does not know what he or she is really trying to say. Decide on a message and make sure your report and your abstract convey that message.