Instrument Instructions Project

The instrument instructions project is designed to familiarize you and your classmates with the instrumentation we will be using in the Consumer Product Characterization Project. There are several parts to this assignment:

A. Written Report

The written instrument instructions are required, carries the same weight as a lab report, and normally must be turned in before operating the instrument. The instrument instructions are an "instrument manual" that will be posted to the website and used by the entire class for the rest of the semester. The manufacturer instrument manual and SOP, if available, are posted to the course website and will need to be consulted for portions of the instrument report.

1. Introduction/Theory
   a. Give an overview of what the instrument does. Exactly how it does this will be spelled out later in the document.
   b. Explain what types of analysis the instrument is used for. What types of samples is the instrument capable of analyzing (for example, all or some organic compounds, dissolved metals, inorganic compounds, colored compounds only, etc.)? Generally, what type of sample preparation, etc are required for the instrument?

2. Block diagram/Explanation:
   a. A block diagram should show all of the major instrument components in boxes and their proper relationship to one another with connecting lines. Block diagrams can be neatly hand-drawn if desired. Draw lines connecting the computer to all components either controlled or read by the computer.
   b. A written explanation of the block diagram and include
      1) What the instrument measures and what steps it goes through to do this?
      2) What kind of data is output (spectrum, chromatogram, or single reading).
      3) What instrument parameters are important, and what is their normal value or range.
      3) How to interpret the instrument output (for example, can samples be both identified and quantified; and if so, how is this done).
   c. Annotate a picture of the instrument by labeling the major parts.

3. Individual component diagrams:
   Showing how each major part of the instrument works: For the above example, a diagram of a grating (or monochromator) and the type of detector used would be included, since these are complex parts that are not adequately explained by drawing a box. These diagrams may be photocopied or copied

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4. **Instrument operation:**

a. **Safety precautions** must be given, along with the reasons for these safety precautions.

All steps required for operating the instrument must be outlined:

b. **Instrument startup.** Outline the steps- for example, when to flip each switch or turn on the gas. Include pictures of the instrument annotated to show the locations of pertinent switches, etc.

c. **Instrument setup.** How do you prepare the instrument to run samples? List the appropriate parameters and how to adjust them. Use screen shots, if possible to show which tabs, buttons, etc are needed.

d. **Sample preparation.** What needs to be done to the samples in order to run them on this instrument? Do they need to be aqueous? Filtered? In a particular concentration range?

e. **Instrument operation.** List the steps involved in running samples. Be sure to include pictures, screenshots, etc

f. **Instrument shutdown.** List the steps needed after running samples to shut down the instrument. Include pictures, screenshots, etc, as necessary. Keep in mind that it’s sometimes very crucial to implement these steps correctly.

g. **Troubleshooting.** If you encounter any likely problems in your research or writing the report, be sure to warn your classmates. List each possible problem and, if possible, how to avoid and fix it. Be sure to include notes on **what NOT to do** (common mistakes) to cause the instrument to wear down or need repair.

h. **Instrument maintenance:** List the maintenance tasks which you would have to do if you were in charge of maintaining the instrument, and how often you would have to do them, using the maintenance procedures discussed in the manual and in class. This section should show that you have gone through the manual to learn information on your own. This step is important in building your confidence level as a future leader in the chemical or health professions.

**B. Presentation**

You will be given 15-20 minutes to present introductory material on your instrument to the class. This material should come directly from the first three sections of your written report. These presentations will be performed in front of the instrument, so plan to point out the specific parts of the instrument and what they do. I will furnish a couple (2-3) 24” x 32” white boards that each group can use to prepare additional visual aids. This is also an excellent opportunity to point out common mistakes that should be avoided. Presentations may be video taped and posted to the class website.

**C. Fun Instructions (optional)**

If you think of some additional product that would be helpful to your classmates, you can put together an extra project for additional points. You can be as creative as you want, but be sure to keep the focus on helping others learn about or use the instrument. Videos, screencasts, posters, the sky is the limit. Be creative, have fun!