

IB Chemistry Planning Lab

IB II 2008 – 2009

Introduction:

In the chemical industry, before any reaction is performed, the engineers use the specific heats of formation of the substances involved to predict the heat that will be absorbed or released in the reaction.

The design of the reaction vessels must include heating or cooling technology to maintain the optimum reaction temperature to control the rate of the reaction.

Hence, a knowledge of specific heats of formation, Hess's Law, and heats of reaction is necessary for efficient industrial chemical productions.

Hess's Law is a powerful chemical principle used to predict the heats of a reaction by subtracting the sum of the standard heats of formation of the reactants from the sum of the standard heats of formation of the products.

However, sometimes it is difficult or even impossible to determine the enthalpy of a reaction directly. In these situations, an indirect method employing calorimetry and Hess's Law can be used.

I would like you to **plan a lab to investigate** any aspect of the theory or to study any other aspect of the subject of Thermochemistry that may have triggered an interest in you, but due to time constraints we have not been able to perform and complete this brilliant idea.

This will enable you to test the understanding of chemistry principles and at the same time test your experimental skills.

Previously, when you have performed a planning lab, you have been given the specific research problem that you are required to investigate.

However, this time you must come up with a research question that you wish to investigate.

[Consider this akin to the Group IV project that you have just so successfully carried out, the only minor difference is that you are working alone and entirely responsible for the lab from the planning stage to the experimental stage.]

Your Task: is to write a detailed plan for the lab, based on the IB criteria and then to perform the lab:
Design, Data Collection and Processing, Conclusion and Data Evaluation

It is imperative that your lab report addresses each of the above criteria.

This lab will form part of your final **Internal Assessment** grade.

To help you plan the lab, remember that your experiment does not have to be particularly sophisticated, but it must be a realistic way of answering your research question.

Keep it simple!!!

Make sure that your “research question” can have a corresponding specific hypothesis.

Make sure that your hypothesis is supported by scientific theory.

Write down what you expect to find out from your experiment with sound scientific reasons (i.e. based on scientific theories that you have either studied or researched prior to the experiment).

Once you have thought of a research question think through the stages needed to obtain the required data.

Make sure you explain, in detail, how the results of your experiment will allow you to answer your research question and determine the accuracy of your hypothesis.

You must decide on all the quantities to be used, apparatus and method.

If you do not know the quantities that you wish to use, take a look at the available apparatus, try some measurements to get an idea of amounts that are realistic.

Also remember stoichiometry may be necessary to determine quantities.

Remember that larger is not necessarily better !!!

Once you have decided on the apparatus and quantities you can outline a plan.

It may be necessary to change or adjust the plan. Do not be afraid to change the plan in mid experiment.

Make a note of any changes of your initial plan and discuss the reasons for these changes in your evaluation.

You are familiar with all the sophisticated lab equipment available to you in the Colonel By Chemistry Laboratory.

Let me know the chemicals and solutions that you may require, before performing the lab.

Make sure that you record and present your raw data, both *qualitative* and *quantitative*, accurately.

The following steps may be of help in the planning stage:

1. Topic or theme to be investigated.
2. What do I know about this topic?
3. What can I measure in the lab?
4. Which aspects of the topic are possible areas of research?
5. Choose a research question.
6. Decide on a plan, apparatus and the quantities to use.
7. Carry out the investigation successfully and effortlessly!!!
8. Get ready to get your IB Diploma !!!