IB CHEMISTRY INTERNAL ASSESSMENT

There are five assessment criteria that are used to assess the work of both SL and HL students.

- Design—D
- Data collection and processing—DCP
- Conclusion and evaluation—CE
- Manipulative skills—MS
- Personal skills—PS

The first three criteria—**design (D)**, **data collection and processing (DCP)** and **conclusion and evaluation (CE)**—are each assessed twice.

Manipulative skills (MS) are assessed summatively over the whole course and the assessment should be based on a wide range of manipulative skills.

Personal skills (PS) are assessed once only and this will be during the group 4 project.

Each of the assessment criteria can be separated into three **aspects** as shown in the following sections. Descriptions are provided to indicate what is expected in order to meet the requirements of a given aspect **completely (c)** and **partially (p)**. A description is also given for circumstances in which the requirements are not satisfied, **not at all (n)**. A **"complete"** is awarded 2 marks, a **"partial"** 1 mark and a **"not at all"** 0 marks.

The maximum mark for each criterion is 6 (representing three "completes").

D × 2 = 12 DCP × 2 = 12 CE × 2 = 12 MS × 1 = 6 PS × 1 = 6

This makes a total mark out of 48. The marks for each of the criteria are added together to determine the final mark out of 48 for the IA component. This is then scaled at IBCA to give a total out of 24%. General regulations and procedures relating to IA can be found in the *Vade Mecum* for the year in which the IA is being submitted.

GRADE BOUNDARIES FOR INTERNAL ASSESSMENT

IA CHEMISTRY							
Grade	1	2	3	4	5	6	7
SL mark range	0-8	9-16	17-22	23-27	28-33	34-38	39-48

WRITING A LAB REPORT GUIDE

Introduction

1. First you should give the aim of the investigation. It should be clear and concise. If the teacher states the aim you shouldn't just copy that down, you need to change it to get a full score.
2. Second, you need to write the hypothesis and prediction of the investigation. The hypothesis needs to be very clear, giving an exact and complete description of what might happen (and why). The prediction is written like: If ...then...
3. You can also give a general background to the study if you feel like it's relevant and necessary.
4. Here you should present the different variables. The independent variable is the one that you alter throughout your experiment. For an example, if you investigate the effect of temperature on yeast fermentation, then the different temperatures that you use are the independent variable.
5. The dependent variable is the variable that you measure. Using the yeast example, the dependent variable would be the amount of CO_2 produced by the yeast (this shows how well the fermentation is going).
6. The controlled variables are the ones that you try to keep constant throughout your experiment so that they don't affect your experiment. If investigating the effect of temperature in yeast fermentation, the controlled variables would be the amount of yeast and water, the time for fermentation, etc.

Materials and method

1. First give a list of all the equipment used in the experiment. Give the size of beakers/measuring cylinders, etc., used, give the names of any chemicals that are used in the experiment.
2. You can use a diagram (picture) to show the experimental set up if you find it necessary.
3. Now you should describe the method. It should be written in past tense (i.e. not written as a guide on how to carry out the experiment again, but rather, how you did it). The steps in the experiment are either self-evident or explained.
4. In this part you should explain the different variables. Write how the independent variable was varied. Using the yeast example, the independent variable can be varied by placing the fermentation tubes in hot water baths of different temperatures.
5. Write how changes of the dependent variable were monitored. You should write how you got your results, e.g. by reading from the scale on the fermentation tube to see how much CO_2 that has been produced.
6. Write how the controlled variables were controlled. Using the yeast example, you write that you made sure that the amount of yeast used in each fermentation tube was the same (because you used a scale), that you used a watch to make sure that the time that the tubes were allowed to ferment was the same for all tubes.
7. Write how you made sure that the sufficient relevant data was recorded. Describe the method for data collection, i.e. if you had several trials, if you used controls, methods of measurements, if your calculations are correct, etc.

Results

Data collection

1. Record all your raw data in tables. The tables should be numbered and have captions in which you briefly describe the contents of the tables and how you recorded the results. Titles, units and the uncertainty should be given in the headings of the tables.
2. Underneath the table you can briefly describe the results. You can describe the main trends and account for any anomalous result. You don't have to discuss the significance of the results to the aim of the investigation.

Data Processing and presentation

1. The data should be processed (calculated) correctly and presented in tables (as above) and graphs. If you use graphs, they should have a caption in which you describe the contents of the graph. The axes of the graphs have to be labelled with units and the points have to be plotted correctly. Make sure that you use the correct type of graphs. If both variables are continuous, use a scatter graph.
2. Error analysis should be carried out if possible (calculate the percentage uncertainty, etc).

Conclusion

1. In the conclusion you should discuss the results you obtained in relation with your hypothesis. Write a conclusion based on an interpretation of the gathered results.
2. Compare your results with literature values if possible.

Evaluation

1. In the evaluation you should evaluate the method used. Write about the main weakness of the method used and the weakness in the method of manipulation of data.
2. Write about the source of error, but don't include personal mistakes.
3. Suggest real improvements (that can be carried out in the school lab) to the investigation.
4. Discuss further investigations that are of interest and can be carried out and new questions that could be posed. [1]

[1] Retrieved from http://goto.glocalnet.net/ibweb/homepagelink.htm, June 2012.

LAB WRITE-UP CHECKLIST

Design

1. **Research question:** Did you state the question/purpose? (How will ... affect ...?
2. **Independent Variable:**
   a. Have you identified the Independent Variable
   b. Have you listed levels of the Independent Variable?
   c. Have you justified that the number of levels, the range of levels, and the intervals are good enough?
   d. Have you stated how each level of the Independent Variable will be made?
3. **Dependent Variable:**
   a. Have you identified/defined the dependent variable?
   b. Have you stated how DV is specifically measured?
4. **Control variables:**
   a. Have you listed controls?
   b. Have you compared your list with the list in the lab guidelines?
   c. Have you explained what effect not controlling each variable will have?
   d. Have you explained how each one will be controlled?
5. **Materials:** Have you listed all the materials you will be using?
6. **Method:**
   a. Is it clear what is being done in this experiment?
   b. Does your method allow and show the control of all variables?
7. **Analysis:** Have you addressed what analysis will be done to answer the lab's question?

Data Collection

1. Do tables have labels/units?
2. Do all quantities have uncertainties present?
3. Do uncertainties have the same number of decimal places as the measurements?
4. Do significant figures show precision of tool used?
5. Are there any deviations from normal sig fig/uncertainty protocol stated with reason.
6. Are qualitative observations included?
7. Are qualitative observations are thorough? (Each trial? Before, during, after?)
8. Is there other data to be used (literature values, concentrations, etc.)
9. Do you have titled, numbered and well organized tables?
10. Are sources of data looked up included?

Data Processing

1. Are calculations labeled?
2. Are the relevant equations shown?
3. Are units displayed?
4. Are the correct significant figures reported?
5. Are the calculated results presented in table?
6. For labs that have analysis questions: are all questions answered thoroughly?
7. Are the important patterns discussed?
8. Are the important patters displayed in graphical or tabular form?
9. Do graphs have good scale, labels and tick marks?

Conclusion

1. Conclusion drawn? (Answer the lab's question!)
2. Final values (data) included?
3. Conclusion is justified
   a) Comparison to expected (hypothesis, literature value, percent error)
   b) Meaning of results (in terms of theory, at molecular level)
   c) Is your value accurate? How do you know?
   d) Have you addressed the magnitude of the uncertainties in calculated data and identified the data that contributed the most uncertainty to your final result/conclusion?
   e) Qualitative observations have been included in discussion
4. Reasoning is logical and based on sound understanding of chemical principles involved.
5. Have you identified the limitations of your conclusion? Overall, is your data valid? Can your pattern be extrapolated?

Evaluation

1. Have you identified ALL the weaknesses and errors in this experiment?

- errors that lead to lack of precision
- errors that make value to low or two high
- errors in the assumptions you made about how this would work or how easy it would be to measure a particular value

2. Have you stated the magnitude of each error (was it significant or minimal? Does it explain the error in your result or is it something that appears to have no effect?)
3. Have you identified a specific improvement for each error?

Internal Assessment Criteria

Design

Levels/marks	Aspect 1 Defining the problem and selecting variables	Aspect 2 Controlling variables	Aspect 3 Developing a method for collection of data
Complete/2	Formulates a focused problem/research question and identifies the relevant variables.	Designs a method for the effective control of the variables.	Develops a method that allows for the collection of sufficient relevant data.
Partial/1	Formulates a problem/research question that is incomplete **or** identifies only some relevant variables.	Designs a method that makes some attempt to control the variables.	Develops a method that allows for the collection of insufficient relevant data.
Not at all/0	Does not identify a problem/research question **and** does not identify any relevant variables.	Designs a method that does not control the variables.	Develops a method that does not allow for any relevant data to be collected.

Data collection and processing

Levels/marks	Aspect 1 Recording raw data	Aspect 2 Processing raw data	Aspect 3 Presenting processed data
Complete/2	Records appropriate quantitative and associated qualitative raw data, including units and uncertainties where relevant.	Processes the quantitative raw data correctly.	Presents processed data appropriately and, where relevant, includes errors and uncertainties.
Partial/1	Records appropriate quantitative and associated qualitative raw data, but with some mistakes or omissions.	Processes quantitative raw data, but with some mistakes and/or omissions.	Presents processed data appropriately, but with some mistakes and/or omissions.
Not at all/0	Does not record any appropriate quantitative raw data **or** raw data is incomprehensible.	No processing of quantitative raw data is carried out **or** major mistakes are made in processing.	Presents processed data inappropriately **or** incomprehensibly.

Conclusion and evaluation

Levels/marks	Aspect 1 Concluding	Aspect 2 Evaluating procedure(s)	Aspect 3 Improving the investigation
Complete/2	States a conclusion, with justification, based on a reasonable interpretation of the data.	Evaluates weaknesses and limitations.	Suggests realistic improvements in respect of identified weaknesses and limitations.
Partial/1	States a conclusion based on a reasonable interpretation of the data.	Identifies some weaknesses and limitations, but the evaluation is weak or missing.	Suggests only superficial improvements.
Not at all/0	States no conclusion **or** the conclusion is based on an unreasonable interpretation of the data.	Identifies irrelevant weaknesses and limitations.	Suggests unrealistic improvements.

Manipulative skills (assessed summatively Sem. 2)

This criterion addresses objective 5.

Levels/marks	Aspect 1 Following instructions*	Aspect 2 Carrying out techniques	Aspect 3 Working safely
Complete/2	Follows instructions accurately, adapting to new circumstances (seeking assistance when required).	Competent and methodical in the use of a range of techniques and equipment.	Pays attention to safety issues.
Partial/1	Follows instructions but requires assistance.	Usually competent and methodical in the use of a range of techniques and equipment.	Usually pays attention to safety issues.
Not at all/0	Rarely follows instructions **or** requires constant supervision.	Rarely competent and methodical in the use of a range of techniques and equipment.	Rarely pays attention to safety issues.

*Instructions may be in a variety of forms: oral, written worksheets, diagrams, photographs, videos, flow charts, audio tapes, models, computer programs, and so on, and need not originate from the teacher.

Personal skills (for group 4 project assessment only Sem. 1)

This criterion addresses objective 4.

Levels/marks	Aspect 1 Self-motivation and perseverance	Aspect 2 Working within a team	Aspect 3 Self-reflection
Complete/2	Approaches the project with self-motivation and follows it through to completion.	Collaborates and communicates in a group situation and integrates the views of others.	Shows a thorough awareness of their own strengths and weaknesses and gives thoughtful consideration to their learning experience.
Partial/1	Completes the project but sometimes lacks self-motivation.	Exchanges some views but requires guidance to collaborate with others.	Shows limited awareness of their own strengths and weaknesses and gives some consideration to their learning experience.
Not at all/0	Lacks perseverance and motivation.	Makes little or no attempt to collaborate in a group situation.	Shows no awareness of their own strengths and weaknesses and gives no consideration to their learning experience.

The assessment can be assisted by the use of a student self-evaluation form, but the use of such a form is not a requirement.

MY INTERNAL ASSESSMENT GRADES

LAB	D /6	DCP /6	CE /6	MS /6	PS /6	Total Points (Out of 48)	Grade