 

Ceramics Lab Course - Experiment X:

**Title of experiment**

Lab report

Name: xxx
Matriculation no.: xxx
Study course: xxx
Group no.: xxx
E-Mail address: xxx

***Guidelines for the creation of reports for the ceramics lab course:***

*The creation of reports serves as an exercise for independent scientific writing. This plays an important role in the scientific career especially concerning Bachelor’s, Master’s and PhD theses and the publication of papers in scientific journals. All reports that are written in the framework of the ceramics lab course underlie the same rules as any other scientific essay, particularly with regard to the rules of good scientific practice. This includes the prevention of plagiarism. If significant violations of these rules occur, the protocol will be graded as ‘failed’.*

*The students have to write one report per lab group for each experiment. The guidelines below should help with the creation of protocols. They are also a measure of the reports quality for grading.*

***General:***

*The reports have to be written in formal English. Overlong sentences and complex sentence structures should be avoided to support comprehension. The materials and methods part, observations and results are presented in past tense. The pronouns ‘I’ or ‘we’ must not be used. Expressions like ‘some’, ‘warm’ or cold’ should be avoided. Instead, exact descriptions should be used.*

*All figures (including plots) are numbered and a caption is added (below). Tables are numbered separately and a heading is provided (above). If necessary, descriptions or remarks should be added to the caption of figures or the heading of tables (see Fig. 1).*



**Fig. 1:** Funny image of a student in a lecture hall at 8 AM. Using a frying plate, he is preparing pancakes and bacon. (A Collection of Musings Blog, 2014)

*Equations are enumerated by right‑aligned numbers. Like in the following example all parameters of an equation have to be defined:*

*d* = *w* – *f* (1)

Where *d* represents ‚denial‘, *w* ‚what I think‘ and *f* ‚the facts‘ (Bourne, 2009).

 *All plots and tables have to be mentioned and described in as much detail as necessary.*

*Tables should be formatted according to scientific standards (see Tab. 1). This includes framing the data with horizontal lines above and below the data set as well as one horizontal line below the column labels (grid patterns should be avoided). The title should be as informative as possible and should include table number, parameters, sample types etc. Also, the columns and lines should be labelled as precise as possible, e.g. use ‘Clay’ and ‘Alumina’ instead of ‘Sample 1’ and ‘Sample 2’. The values in the table should be explicit. If necessary they should be explained, e.g. as arithmetic mean or median with standard deviation (SD) or standard error of the mean (SEM), i.e. mean value ± SD/SEM. All tables should be understood without consulting the lab report for details. To achieve this, footnotes can be used. (Lang, 2017)*

**Tab. 1:** Mass of samples of different material types. The masses are given as arithmetic means of 10 samples with standard deviations.

|  |  |
| --- | --- |
| **Material type (each n = 10)** | **Mass (g)** |
| Alumina | 10 | ± 1 |
| Silica | 20 | ± 2 |
| Titania | 30 | ± 3 |
| Yttria | 40 | ± 4 |

*Correct units always have to be used. For measured values, calculated mean values etc. the amount of positions after the decimal point should be in agreement with the precision of the experiment or measurement technique. In between figures and units a non-breaking space (Mac: option-space, Windows: cntl-shift-space) should be inserted. Examples: 5 mL, 3 °C, p = 5 Pa, Exception: single, superscript figures: 45°. The text should be formatted in justification with 1.5-spacing.*

***References:***

*Theoretical background information, scientific relations and literature values have to be supported by citations of scientific journals or books. Only established scientific citations styles should be used. If figures were taken from external sources the source needs to be indicated. In the reference section, all sources should be clearly displayed.*

*Citation styles can be looked-up under:*

[*http://pubs.acs.org/userimages/ContentEditor/1246030496632/chapter14.pdf*](http://pubs.acs.org/userimages/ContentEditor/1246030496632/chapter14.pdf)

# Abstract

The abstract includes a brief summary of objective and motivation of the experiment (Why was the experiment conducted? Which relationship should be shown?), scientific problem and methods (How can the relationship be made clear? Which experiment was conducted to this extent? Which materials and measurement techniques were used?) as well as the most important qualitative and quantitative results. The abstract must not exceed one half page. The abstracts of scientific papers can serve as examples.

# List of abbreviations

CVC Colloidal vibration current

*(optional)*

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# Introduction

The background, theory and measurement technique which is relevant to the specific experiment is described here. The introduction should be as brief as possible, but as detailed as necessary.

By reading the introduction scientifically interested people should be able to understand the experiments performed as well as their results and discussion.

# Materials and Methods:

Here, a short description of the performed experiments and the used materials or samples should be given. Investigates materials with their relevant properties, used measuring instruments and important parameters should be given. Relevant, non-trivial processes, that could have an impact on the measured results should be mentioned. One example of a trivial experimental procedure that should not be mentioned is the usage of a spoon for filling a beaker.

# Results

In this part, the data should be presented and described in an appropriate manner. Commonly, this is done in the form of plots and tables. The scaling and labeling of the axes of the plot (see Fig. 2) should be correct. The text should describe the most important results (shape of the graph, maximum values etc.) and set them in a meaningful context. The interpretation of results is done in the discussion section.

**Fig. 2:** Zeta potential curve of two fictitous materials 1 and 2 in a pH range of 5 to 9. The zeta potential was determined using the CVC technique. Polynomial regression lines of the data sets as well as their equations and the coefficient of determination are indicated.

# Discussion

This is the most important part of the lab report. In the discussion, the relevant qualitative and quantitative results and conclusions, which can be derived from the gathered data, are presented. They should be connected to the theoretical background from the introduction part. Therefore, all concepts which are presented here should be explained in the introduction. Also, the accuracy of the data should be estimated qualitatively. If errors occurred during the experiment, those need to be discussed as well.

# References

A Collection of Musings Blog, 7 University Courses I Wish I Had Taken [Online], Nov 14, 2014. <https://acollectionofmusings.wordpress.com/2014/09/14/7-university-courses-i-wish-i-had-taken/> (accessed Feb 14, 2018)

Bourne, M., MoreNewMath - funny equations about life [Online], Sep 02, 2009. <https://www.forschen-schreiben-publizieren.de/2017/08/tabellen-wissenschaftliche-publikationen/> (accessed Feb 14, 2018)

Dodd, J.S.; Solla, S; Bérard, P.M. References. In The ACS Style Guide – A Manual for Authors and Editors [Online]; Coghill, A.M.; Garson, L.R. Eds.; Oxford University Press, 2006; chapter 14, pp 287–341. <http://pubs.acs.org/userimages/ContentEditor/1246030496632/chapter14.pdf> (accessed Feb 14, 2018)

Lang, S., Tabellen in wissenschaftlichen Publikationen – wie macht man´s besser? [Online], Aug 24, 2017. <https://www.forschen-schreiben-publizieren.de/2017/08/tabellen-wissenschaftliche-publikationen/> (accessed Feb 14, 2018)