FACULTY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF CHEMICAL ENGINEERING

Full & Short Report Format:

Title page:
Title in capital letters, institution and department, student name, registration number, group number, group members, supervisor's name, and date. Adequate spacing,

Abstract (see an example below):

- Abstract is a brief summary of the report.
- Example: The objective of this experiment is to study … by means of … in the range … Results showed … and compared (un)fortunately with (un) published values. It was concluded that …. recommended.
- Cite no references except by author's name and only if essential.
- One paragraph preferably less than 200 words.

Table of contents:

- Section number (if numbering is used), major heading, and page numbers.

Introduction: REMOVE From SHORT REPORT (1 page)

- Purpose of experiment (objective).
- Approach taken (general remarks).Utility of such measurements.
- General background.

Theory: REMOVE From SHORT REPORT (4 pages max)

- Equations and supporting references.
- Do not use equations or theories that irrelevant to your experiment.
- Use appendices fro necessary derivations.
- Results expected.

Experimental method: REMOVE From SHORT REPORT

- This section provides details on experiments conducted. Provide enough details so others can follow your procedure and duplicate the work.
- Equipment used in the experiment. Use schematic diagram of apparatus. Procedure should refer to it.
- Procedure of experiment and variables tested ; procedure should refer to it.
- For detailed procedure (steps are preferred) refer to the lab. manual.
- Give criteria for steady state or equilibrium.

Results:

- This section reports only final results. Raw data and intermediate results not related to the experimental focus should be placed in the appendices.
- Explain what results are obtained; and how obtained from raw data.
- Results are presented in graphical and/or tabulated data. Graphical data is preferable to tabulated data (do not duplicate tabulated & graphical data).
- Theoretical background should be linked here to the experimental method.
- Label all figures and tables (see Fig.(1) & Table (1)).Figure title should be placed below the figure, and Table title is placed above the table.
- Use unified system of units (SI units are preferred).
- Place raw data and tabular data in appendix if extensive.

Discussion of results (see sample below):

- This section discusses the meaning of results in the previous section. Results and Discussion can be presented as two separate sections or as one section. The former case is preferable in Full Reports and the latter case in Short Reports.
- Are the experimental results consistent with those anticipated in the theory section?
- Compare results with published ones.
- Error analysis: evaluate the relative importance of errors.
- Anticipate conclusions and recommendations.

- **Conclusions & Recommendations:** Conclusions: A short restatement of important points presented in the report.
- Summaries of the main ones.
- Do not discuss results here and do not conclude anything that had not been discussed
- Address the objective of experiment.
- Once conclusions are made, make some recommendations to the utilities of those conclusions.
- In Recommendations, explain how useful the methodology and the results are, and mention restrictions or limits pertaining to the use of the results.
- Conclusions and recommendations may be in the form of descriptive paragraphs or running lists.

References: (see sample below)

- Put them in the standard way.
- References could include: books, papers, reports, websites, newspaper articles, dissertations, government publications, and interviews, magazines, discussion with an expert to name a few.
- References should be numbered and cited in within the text.

Notation: REMOVE From SHORT REPORT

- Collect symbols alphabetically here (capital before small letters & Greek symbols come at the end), define them, and give units.

Appendices:

- Entitle each one.
- Examples: Raw data, Sample of Calculations, reference graphs or tables necessary for calculations, etc.

General formatting notes

- Use font type: Times New Roman; Font size: 12, Line spacing 1.5.

Number all pages. Title pages is left without numbering; all sections up to Introduction are numbered using Greek numbering. Introduction and afterwards are numbered in Arabic numbers.

Sample of Abstract:

In this experiment the closed loop response of a flow process is investigated using a computerized FLOW CONTROL MODULE. The objective of this experiment is to study the response of a closed loop flow control system under the P, PI & PID control configurations. As expected, the use of P-controller results in a permanent offset, which was found to decrease by increasing the P-controller gain (K_c). The introduction of Integral control action using the PI-controller results in an offset elimination at the expense of increasing the controlled variable overshoot. The PID controller tends to destabilize the controlled process due to the inherent noise in the measured flow. The continuous cycling (online tuning) method was used in this experiment to estimate the best controller parameters (K_c, τ_i & τ_d) using the recommended empirical formulas of Ziegler and Nichols. Using this tuning method, the closed loop response due to step changes in both set point and load is found satisfactory.

Sample of Introduction:

Effective operation of energy-intensive heat exchange units like dryers and chillers are of great importance in any site to ensure adequate utilization of input energy at reasonable costs. The process involves using a fuel to heat input air for subsequent use in drying. Lack of control on the energy inputs and extracted work could yield to significant economic and energy losses. In this experiment we will analyze the performance of dryers used at our university. This will be done by determining the levels of excess air used by the dryer and the amount of energy consumed for heating the air in attempt to calculate the efficiency of the process.

Sample of Experimental procedure:

Porous silica materials were prepared under various conditions. Specifically we will investigate the effect of: 1) surfactant (with and without, short chain, and long chain), 2) silica source (TEOS, TBOS, T-group), 3) counter ion of the acid catalyst (HCl, HNO3, and H2SO4), and 4) agitation (mixing vs. stagnant growth). A list of the productive samples and growth conditions is summarized in Table x. In preparation, the aqueous solution is prepared by gradual addition of the surfactant into water with slow mixing followed by adding the required amount of acid. The acid should be diluted (~ 1 molar) to reduce hazards of its handling. Finally we add the silica source and cover the beaker carefully with a parafilm. If growth is under stagnant conditions, place the beaker on a bench and leave it. If growth is under mixing conditions, we let it grow on a hotplate with mixing using stirring rod. All samples were grown at room temperatures with times ranging from a few hours up to 14 days. Stagnant conditions normally require longer times for growth of worthy amount of silica. The grown silica is then carefully collected by filtration, washed several times with de-ionized water and dried overnight at ambient conditions. The final materials are tested by X-ray Diffraction (XRD) to reveal the product structure and by scanning electron microscope (SEM) to analyze product morphology. (note: you can provide more details of each test conducted).

Sample of Figures:

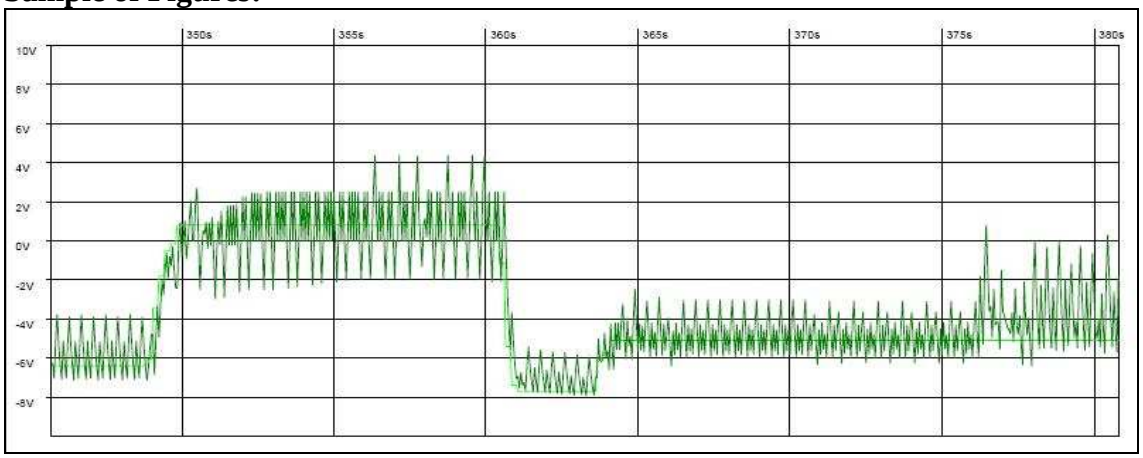

Figure (1): Response of a flow rate due to successive step changes in the set point under PID control action with K_c = 15.21, integral time constant τ_I =2.2 s & and derivative time constant τ_d = 1.2 s.

Sample of Tables:

Table (1): Effect of proportional controller gain on offset at a fixed set point = 60 L/h.

K_c	0.49	0.81	1.6	2.4	3.2	4	5	7	9	12	14
Offset	73	72	71	70	69.5	69	69	68	67	65	64

Sample of "Discussion of Results":

Fig.(1) shows the effect of controller gain (K_c) on the closed loop response and on the offset (difference between the set point and the controlled variable at steady state). By referring to Table (1), it is clear that as K_c increases the offset decreases; however, the degree of overshoot increases as can be seen in Fig.(1). At large values of K_c the process starts to exhibit high overshoot and tends to oscillate continuously at an ultimate gain K_u = 64 units and an ultimate period of oscillation P_u = 3 s. From theoretical point of view the roots of the characteristic equation lie now on the imaginary axes on the complex plane. A further increase of the K_c value ($K_c > K_u$) results on an unstable closed loop response, where the roots of the system characteristic equation lie now on the right hand side of the complex plane. This case is shown in Fig.(2) where the controller gain is 65 units.

Sample of "Conclusions and Recommendations":

During experimentation of the distillation column the group noticed that some distillate is being formed even during total reflux. This could indicate a problem with the reflux valve. This could also explain the problem with the reboiler volume during batch distillation experiments. We recommend that the behavior of the reflux valve should be monitored to ensure it is functioning correctly. The experiment on the distillation column was very useful in linking the practical experience with the theoretical knowledge of unit operations.

Sample of References (APA style)

Book: Geankoplis, CJ., (2003). *Transport processes and separation process principles* (4th Ed.*), simple distillation methods* (pp. 700-720). Upper Saddle River, NJ: Prentice Hall.

Paper: Xara, S., Delgado, J., Almeida, M., Costa, C. (2009). Laboratory study on the leaching potential of spent alkaline batteries. *Waste Management*, 29(issue), 2121.

Website: Wikipedia (2011). *Flash evaporation*. Retrieved October 25, 2011, from http://en.wikipedia.org/wiki/Flash_evaporation.