

Pre-Plan Report for Plant or Lab Operating Personnel

Posted on September 27, 2019

Pre-Plan Report

The pre-plan report is written for your supervisor and for plant or lab operating personnel. For your supervisor, who has given you a job to do in general terms, you are preparing a detailed plan of your proposed work. For operators who will perform the experimental work, you tell them exactly what you want done. To accomplish these objectives, the proposal report will be written according to the following outline:

- Title page (title, names, date, etc.)
- Purpose of Experiment
- Literature Review
- Experimental Plan
- Line Sketch of Equipment
- Materials and Equipment Required
- Safety Precautions
- Data and Results Sheets

Bibliography: A description of the material, which goes into the individual sections of this report, follows the Title Page. The title should identify the work for filing, abstracting, database searching, etc. The title should tell a potential reader if she/he wants to go further. Do not make the title too general ("Pumps"), but do not make it several lines long. Include the name(s) of the author and the date the report was written. **Purpose of Experiment** The purpose of the experiment project should be stated clearly and briefly. In most laboratory investigations, the purpose will be to study the effect(s) of a variable or variables upon system parameters. An example of such an investigation would be the effect of gas velocity on mass transfer rate. In other experiments, however, the purpose will be to evaluate the overall performance of a piece of equipment, such as when determining the overall efficiency of a distillation column operating at given conditions.

In this laboratory, you may be developing several experiments for a particular apparatus, so there may be several objectives for the work. You are presenting your plan to achieve a desired objective. There is an implied question to your supervisor, "May I execute this plan?" Performing experiments costs money and time. In this lab, the "supervisor" is concerned with safety and feasibility (equipment availability, time requirements, etc.) **Literature Review** The purpose of the literature review is to briefly acquaint the reader with the theoretical and/or practical aspects of the subject under investigation. In general, the literature review will consist of a brief review of the major field and a

more intensive coverage of the specific topic. If the specific topic is batch distillation of a 1,2-dichloroethane – toluene mixture, the major field is distillation. This section is to be a review of the literature, not a summary of your personal knowledge. Every paragraph should contain at least one citation. In addition, equations, tables, and figures should have citations. However, only pertinent articles or textbook material relating to the specific topic should be mentioned. Citations should include the reference number or name used in the bibliography and the page number(s) cited. References can and should include textbooks, reference manuals, technical journals, and trade literature.

Experimental Procedure

This section should tell the reader (boss, operator) exactly what is to be done. It must be referenced to a line sketch of the equipment (if applicable) and should be given in a step-by-step format. Write in detail, step-by-step. Include any special safety precautions, e.g., “when opening valve V1, be sure not to” The line sketch must have all pieces of equipment labelled, and the procedure should refer to pieces of equipment by their labels. Include a legend describing the function of each piece of equipment used (e.g., V1 – water supply valve) in alphabetical order. Line sketches need not be exactly to scale but should correctly show relative positions. The line sketch should be on the first page after it is referenced by the procedure. The data sheets should be such that a technician could record data and, by use of equations and calculation procedures shown later in the sample calculations, be able to determine the results. A properly prepared spreadsheet can be of great help. The list of materials should match with the procedure. Check the availability of equipment/supplies/chemicals before writing the procedure. You cannot perform the experiment until the safety audit is complete.

Emergency Shutdown Procedure

Include immediately after the standard operating procedure an Emergency Shutdown procedure telling what should be done in case of emergency evacuation to prevent injury to rescue personnel or others returning to the laboratory (e.g. close the steam valve).

Safety Precautions

List all safety precautions that must be followed to protect people and equipment. In particular, list precautions needed for handling all chemicals used, except air and water. Additionally, first aid measures to be taken in case of accidental eye contact, skin contact, inhalation, and ingestion must be listed.

Bibliography

Use standard reference forms found in technical journals, such as *Chemical Engineering Progress*.

Data And Results Sheets

The preliminary report will contain either prepared data sheets or an output table for electronic data collection. Careful preparation of these sheets or tables will help to ensure the attainment of proper results. Remember that too much data is far better than too little. The data sheets should be prepared with consideration of how the data is to be analyzed. It may be a good idea to simulate some data and carry out an analysis of the data to determine if you will be collecting all of the needed data. A separate column (or space at the bottom of the data sheet) should be provided for comments and visual (or other) observations. This information may later help to explain discrepancies in your results. The sample calculations should allow you to go all the way from raw data to

final results. Any data validity/consistency checks that can be done should be listed and are expected to be implemented during lab time.

Final Report

The final report will be a manual that can be used to quickly familiarize a reader with the capabilities of the experimental equipment. The contents are as follows:

- Title Page
- Table of Contents
- Overview of Experiment(s)
- Literature Review
- Experimental Procedure(s)
- Sample Data and Results
- Methodology of Analysis – Discussion of Results – Limitations of Results
- Conclusions
- Recommendations for Future Work
- Bibliography

Appendices – Experimental Data and Results – Sample Calculations– Equations and Derivations This report should be developed from the information presented in the initial proposal as well as information developed during the course of experimental testing. Miscellaneous Report Writing Information Discussion of Results The discussion is the section of the report where you evaluate your results. Were the results of the experiment expected? In other words, did your results compare well with previous observations or reported values? If not, what factors might explain the discrepancy?

Provide reasons that fit with your observations; don't advance explanations that have no basis for support. A statement like "the reaction yield was low because the catalyst was poisoned" needs to be backed up with an observation such as "The catalyst had been previously exposed to X, which is known to poison the type of catalyst employed in this experiment." A blanket statement of "experimental error" explains nothing unless you can point to something specific that was done incorrectly during the experimental work.

Conclusions

The conclusions should be put in a bullet-point format. Conclusions should follow directly from the analysis of the experimental results and be supported by the discussion. It is unlikely that you will have many conclusions. Don't fill the list with general statements that are not directly related to your work.

Verb Forms

- In the final reports, the experimental section should be written in the past tense, with a passive voice. For example, The flask was filled with water.
- Both past and present tenses are used in the Literature Review. For example, Distillation is a unit operation whose basic principles were studied by Rayleigh.
- The discussion of results is written in the past tense with an occasional swing into the present tense.
- Conclusions are always written in the past tense.
- Most technical writing is done in the third person, although occasionally, it is correct to use the first person to avoid extensive use of the passive voice. Guidelines for Figures and Tables
- A figure number and descriptive title at the top or bottom of the page must identify figures. A table number and title at the top of the page must identify the tables. Figures and tables are referred to by number in your report.
- Figures must have clearly labelled axes with appropriate units in the case of graphs or clearly labelled parts in the case of a schematic-type diagram. Tables must have clearly labelled columns and/or rows.
- Small tables (less than one-quarter page) may be included in the text. Larger tables and all figures should be placed on the page following their first reference.
- All actual experimental data points must be clearly delineated by means of a small circle, rectangle, or other symbol drawn by a computer or with the aid of a template. Different symbols must be used for data that have been collected under different conditions and plotted on the same graph.
- The format of the tables and scale ranges of the graphs must be designed to use as much of the available space as possible. Provide reasonable margins around all tables and graphs. However, avoid scales as ten squares = 21.5 units.

- All curves must be drawn using a computer and/or good graphical techniques.
- All notes should be placed on the figure, not in the margin.
- For an example of a good figure, see the next page.