

# Experimental Considerations

Unit Operations Laboratory  
Winter 2020

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## A. Preparation to Run the Experiment

1. Read all the material about the experiment, including the user's manual and any other information on the website
2. Identify all safety hazards
3. Identify all pieces of equipment and what the purpose is of each piece
4. Identify startup, shutdown, and operating procedures

## B. Experimental Procedure

1. What is the objective and what are the limitations of the objective? (e.g. The objective is to obtain the head loss coefficient of a ball valve. The coefficient will be valid from Re numbers between 1000 and 5000).
2. Plan ahead: What does the theory tell you to measure?
3. What equipment is available?
  - a. What range of conditions will it provide?
  - b. Calibrate/check it (don't trust anybody!)
4. What magnitudes of values do you expect to measure?
5. What magnitudes of error do you expect?
6. How much time is needed to reach steady state?
7. What assumptions are you assuming during your experiments and in your analysis? How will you test these assumptions?
8. What conditions (values of the variables) should you examine?
9. How many replicates should you run? What order?
10. How will you use the measurements & analyses to obtain the objective at hand?

## C. Experimental Results and Analysis

1. Think carefully--does the equation apply?
2. Keep error analysis in mind:
  - a. Standard deviations/confidence intervals
  - b. Are differences significant?
  - c. Evaluate suspected influence of unintended effects using propagation of error/probable error
3. Compare experiments with theoretical predictions, results in the literature, common sense
4. Note: Figures and tables for presenting the results must be developed individually for the two individual reports. However, a figure showing the apparatus (used in the Methods section) may be developed as a team.