

FST101A: Lab 9 Water Activity

Student Lab Report Guidelines

Fall 2020

Pay careful attention to the instructions. If you are unsure about what to do, contact any of the TA's for the course.

INTRODUCTION:

An introduction is the place in a manuscript where the reasoning behind an experiment is introduced. It often contains a brief synopsis of what is currently known about the subject, which segues into the purpose of the experiment and the hypothesis you had before performing the experiment. Your hypothesis does not need to be correct – it just needs to be testable. You describe whether your hypothesis was correct or not in the Discussion.

For this week, you will need to write a formal introduction in paragraph format. For the introduction to this week's laboratory report, answer each question full sentences, and then organize into paragraphs that will constitute your introduction.

1. What is adsorption and de-adsorption relative to moisture content?
2. What is the difference between water activity and moisture content?
3. If you are a pathogen, is water content or water activity more important for your survival?
4. Describe how to use water activity in the formulation of a product.
5. Describe some water activity regulations.

PURPOSE AND HYPOTHESIS

Based on your introduction, write the purpose of this lab. You can start the sentence with the following: *The purpose of this experiment is to* Remember that your introduction segues into the purpose of the experiment.

Based on what is being tested in this lab, write a sentence describing what you think the outcome will be. You can start the sentence with the following: *I hypothesize that*

METHODS:

Re-read the laboratory manual for the experiment this week. The manual provides you with a set of instructions. A methods section is a description in sentences of what was actually done during the experiment, such that someone could read it and be able to repeat what you did on their own.

The methods section contains the essential information for reproducing the results, but is not meant to be an instruction manual. It is often helpful to break it up into sections.

In your statistical section of the methods, be sure to include one sample calculation for each of the following:

- Initial sample weight
- Final sample weight
- Percent moisture final on a dry weight basis
- Percent moisture change on a dry weight basis

RESULTS:

Once you have made all of your Tables and Figures, remember to refer to them and describe them to the reader in this section.

For this week, you need to create the following tables and figures for your report:

Tables:

1. Dish weight, initial + dish weight, and final + dish weight for potatoes for each salt used. Please include the name and a_w (water activity) for each salt. Also include the percent initial moisture content for potatoes.
2. Dish weight, initial + dish weight, and final + dish weight for dog food for each salt used. Please include the name and a_w for each salt. Also include the percent initial moisture content for dog food.
3. Calculated data for potato flakes: initial (wt_i), dry (wt_d), final sample weights (wt_f), and percent moisture final (dry weight basis), and percent moisture change (dry weight basis). Weights are the weight of the food- no dish!
4. Calculated data for dog food: initial (wt_i), dry (wt_d), final sample weights (wt_f), percent moisture final (dry weight basis), and percent moisture change (dry weight basis). Weights are the weight of the food- no dish!

Figures:

1. Percent moisture change vs a_w for potato flakes. Make sure you take into account the direction of change (i.e. + or -).
2. Percent moisture change vs. a_w for dog food. Make sure you take into account the direction of change (i.e. + or -).

When writing your results, be sure introduce and discuss each of the tables and figures and what they are telling the reader (remember that the reader will not have observed the lab).

As you are making tables and writing about your results, remember to think about the number of significant figures. Only use the number of significant figures appropriate for the measurement, and make sure that you are consistent.

Also be sure to mention the reproducibility of the experiment.

DISCUSSION:

The discussion section is the section where you will interpret your results. For the Discussion for this week's laboratory report, use the questions below as a guide. The Discussion should be written as paragraphs, and describe the results. The questions below are provided to guide you to thinking about the data that was collected and its meaning. It might be helpful to answer each question first, and then formulate your Discussion into meaningful paragraphs.

1. Why is the a_w (water activity) of food important?
2. What is the difference between water content and water activity? Identify one limitation of both measurements.
3. How is moisture content and water activity related?
4. What methods can be used to adjust the a_w of a food?
5. How were the relative humidity of the salt chambers established? Discuss this in relation to the water activities of each salt.
6. Discuss your results by comparing the dog food versus the potato flake samples. How were they different? Specifically, explain reasons for your results based on the classification of foods (i.e., dehydrated and intermediate moisture foods).
7. Discuss which salts gave moisture to each food and which removed moisture from the foods, and explain whether the data yielded from the potato flakes and dog food could correspond to an adsorption or desorption isotherm.
8. For dog food, estimate the initial a_w from the graph of % moisture change vs a_w (Figure 2). (Hint: The estimated a_w at which the % moisture change would be zero is an indication of the initial a_w of the food). Based on this value, discuss whether you would expect this product to be stable against microbial growth.
9. Discuss advantages and disadvantages of this method for measuring moisture in foods. Is this the industry standard?
10. What is the function of a humectant?
11. Explain and expand on water activity and pathogenic relationships. Include anecdotal evidence.
12. Design an experiment to measure the impact of humectants on a product. (+/- controls)
13. You made relative humidity chambers for your food and added different salts and water to them. Why did you add the salts first and the water last?
14. Replicates – discuss how reproducible this way of determining water activity is. Is there another way to determine water activity?
15. Discuss the relationship of the environment in relation to the spoilage of food.