**BIOLOGY 2021-22 September 30, 2021**

**Today’s Agenda (Day 32)**

1. HOUSEKEEPING ITEMS

🡪 Request for Items: As per table for food/household chemistry activities (see Kavina’s list)

1. Homework Check:

🡪 Chapter 6 Vocabulary

🡪

1. Class Activity:

🡪LAB: pH in the Kitchen – see p. 7 of document

🡪UPON RETURN FROM BREAK: Chapter 6 PPT Review

1. ~~Section 6.1 – Atoms, Elements, and Compounds~~
2. Section 6.2 – Chemical Reactions
3. Section 6.3 – Water and Solutions
4. Section 6.4 – The Building Blocks of Life

HOMEWORK:

* READ: Chapter 6 – Chemistry in Biology
* COMPLETE: Lab – Mark & Capture
* **BRING: Items for food/household chemistry activities for FRIDAY!!**
* STUDY: Chapter 6 Test

REMINDERS:

* Lab: Population Ecology – Oct. 1
* **TEST: Chapter 6 🡪 October 14**

**BIOLOGY 2021-22 LABPopulation Ecology Lab**

**Determining the Number of Goldfish in a Pond**

**Pre-Lab Discussion**

Biologists often have to determine the total number of organisms in a large area. If the organisms in the population being studied do not move around, the Random sampling technique can successfully provide an estimate of population size. Another technique must be used with populations such as the fish in a lake. This technique is called the “mark & recapture” method.

**Purpose**

Estimate population size using the mark & recapture technique

**Hypothesis:** How many fish do you estimate are in the pond (zip lock bag)? (you do not have to use the if…then…b/c… method)

**Materials (per group)**

Bag of Goldfish crackers

1 gallon zip lock bag

1 medicine measuring cup

marker pen (any color)

**Procedures**

Obtain a population of goldfish in a pond (You may recognize that these are goldfish crackers in a gallon zip lock bag. A good model of an aquatic ecosystem.)

1. Make sure your population of goldfish is well mixed.
2. Notice that a 0 is present in Column A of Sample 1 to indicate that there are no marked goldfish present in the population before you start your study.
3. Remove a sample of goldfish from your pond with a medicine measuring cup. Make sure the medicine cup is filled to the top with fish. Record the number of goldfish in your sample in column B.
4. Use a marker pen to make a mark on the body of each of the goldfish in your sample. Now you have “marked” the first members of your population indicating that they have been captured!
5. Record the number of goldfish you marked in Column D and return your marked goldfish to the population.
6. In Column A (of sample 2) record the total number of marked goldfish that are now present in your population.
7. Mix your population of goldfish and withdraw another medicine measuring cup full.
   1. Record the total number of goldfish in this sample (both marked and unmarked) in Column B
   2. Also record how many marked goldfish you have “recaptured” in Column C, and how many goldfish were captured for the first time in Column D.
8. Mark each unmarked goldfish in this sample with the marker. Return all the marked fish to the population.
9. In Column A record the total number of marked goldfish that are now present in your population (the sum of all the goldfish you have marked so far).
10. Repeat this procedure. Fill in the data table.
11. For the last 4 samples use the following equation to calculate the total population size.

# marked goldfish in sample (C) = total # marked goldfish in population (A)

# total goldfish in sample (B) **total number of goldfish in population (E)**

Remember that the total number of marked goldfish in the population will increase each time you take a sample and return more marked goldfish to the population.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sample** | **Column A**  # of marked goldfish in **starting population** | **Column B**  # of goldfish in **sample** | **Column C**  # marked goldfish in **sample** | **Column D**  # goldfish we mark and return to population | Column E  Population Estimate |
| 1 | 0 |  | 0 |  | XXXX |
| 2 |  |  |  |  | XXXX |
| 3 |  |  |  |  | XXXX |
| 4 |  |  |  |  | XXXX |
| 5 |  |  |  |  | XXXX |
| 6 |  |  |  |  | XXXX |
| 7 |  |  |  |  | XXXX |
| 8 |  |  |  |  | XXXX |
| 9 |  |  |  |  |  |
| 10 |  |  |  |  |  |
| 11 |  |  |  |  |  |
| 12 |  |  |  |  |  |

Average the population estimates for the last 4 samples. This is the estimated population size.\_\_\_

Now count your population and see how closely the estimated number of goldfish agrees with the actual number of goldfish. Actual number \_\_\_\_\_\_\_\_\_

Calculate the percent error your estimates had. **ESTIMATE population size minus ACTUAL population size. Divide that value by the ACTUAL population size. Multiply by 100:** \_\_\_\_\_\_

**Conclusion Questions**

1. Why do we use the “mark & recapture” method rather than just counting all the organisms in a population?
2. Why would we use this technique instead of the random sampling method with fish in a pond?
3. When else might scientists use this technique in nature?
4. How did you hypothesis compare to your estimated population size? How did it compare to the actual population size?
5. Why do scientists even need to estimate the size of a population?
6. If a population decreases significantly in a given area, what could be some reasons for this drop in numbers?
7. What happens if a population keeps getting exponentially higher? How does nature keep a balance on the population?

**BIOLOGY 2021-22 ACTIVITIES**

**FOOD & HOUSHOLD CHEMISTRY**

OBJECTIVES:

* To prepare and observe the concepts of mixtures (homogeneous and heterogeneous) in the “kitchen”
* To observe physical vs. chemical changes in foodstuffs
* To observe enzymatic browning
* To observe the interaction of acids and bases in common household items

Mini Lab 6.2 - Investigate Enzymatic Browning

What factors affect enzymatic browning? When sliced, an apple’s soft tissue is exposed to oxygen, causing a chemical reaction called oxidation. Enzymes in the apple speed this reaction, producing darkened, discolored fruit. In this lab, you will investigate methods used to slow enzymatic browning.

Procedure

1. Read and complete the lab safety form.

2. Predict the relative amount of discoloration each of these apple wedges will show when exposed to air. Justify your prediction.

**Sample 1**: Untreated apple wedge **Sample 3**: Apple wedge submerged in lemon juice **Sample 2**: Apple wedge submerged **Sample 4**: Apple wedge submerged in sugar solution in boiling water

3. Prepare 75 mL of each of the following: boiling water, lemon juice, and sugar solution in three 250-mL beakers.

4. Slice an apple into four wedges. Immediately use tongs to submerge each wedge in a different liquid. Put one wedge aside.

5. Submerge the wedges for three minutes, then place on a paper towel, skin side down. Observe for 10 min, then record the relative amount of discoloration of each apple wedge

Analysis

1. Analyze How did each treatment affect the chemical reaction that occurred on the fruit’s soft tissue? Why were some of the treatments successful?

2. Think Critically A restaurant owner wants to serve fresh-cut fruit. What factors might be considered in choosing a recipe and preparation method?

Graphical user interface, text, application

Description automatically generated

**BIOLOGY 2021-22 ACTIVITIES**

**pH in the Kitchen**



**PURPOSE**:

Students will be able to determine the pH of various kitchen products by using both pH paper and a natural indicator.

**MATERIALS:**

1. pH paper
2. 6 test tubes
3. permanent marker
4. transfer pipets
5. water
6. vinegar
7. lemon juice

8. milk

9. milk of magnesia

10. floor cleaner

11. red cabbage juice in beaker

12. waste container

13. Paper towel

14. Stirring Rod

**SAFETY:**

You will need:

1. Goggles b. Lab Aprons c. Closed-toed shoes

**PROCEDURE:**

1. Label each test tube A, B, C, D, E, or F..
2. Using the transfer pipet provided with each kitchen product, place the following amounts of each product into their respective test tubes as listed in the table below:

**\*\* PLEASE DO NOT MIX UP THE PIPETS\*\***

|  |  |  |
| --- | --- | --- |
| **Test Tube** | **Substance** | **Amount** |
| A | Lemon Juice | One full dropper |
| B | Vinegar | One full dropper |
| C | Milk | One full dropper |
| D | Water | One full dropper |
| E | Milk of Magnesia | One full dropper |
| F | Floor Cleaner | One full dropper |

1. Take your strip of pH paper and tear it into 6 equal pieces.
2. On a piece of paper towel, lay out the 6 pieces of pH paper and under each piece, label them A, B, C, D, E, and F.
3. Dip the end of a stirring rod into test tube A. Gently touch the tip to the piece of pH paper labeled A. Observe and record what happens in the data table.
   1. The color changes can be EXTREMELY fast- be watchful!
4. Repeat step 5 with test tubes B-F and record your observations in your data table.
5. After you have tested the pH of each substance with pH paper, place one full dropper of red cabbage juice into each test tube.
6. Observe and record what happens in your data table.

**DATA:**

|  |  |  |  |
| --- | --- | --- | --- |
| **pH Paper Observations** | | | |
| **Test Tube** | **Substance** | **Color of pH paper** | **Approximate pH** |
| A | Lemon Juice |  |  |
| B | Vinegar |  |  |
| C | Milk |  |  |
| D | Water |  |  |
| E | Milk of Magnesia |  |  |
| F | Floor Cleaner |  |  |
| **Red Cabbage Juice Observations** | | | |
| **Test Tube** | **Substance** | **Color of Solution** | **Acidic or Basic?** |
| A | Lemon Juice |  |  |
| B | Vinegar |  |  |
| C | Milk |  |  |
| D | Water |  |  |
| E | Milk of Magnesia |  |  |
| F | Floor Cleaner |  |  |

**ANALYSIS AND CONCLUSION**: *PLEASE ANSWER IN COMPLETE SENTENCES!! ☺*

1. If the pH paper turns red, is the substance acidic, basic, or neutral? Does the red cabbage juice test agree with the pH paper or not?

2. If the pH paper turns blue, is the substance acidic, basic, or neutral? Does the red cabbage juice test agree with the pH paper or not?

3. If the pH paper does not change color or the red cabbage juice does not change color, what does this tell you about the substance that was tested?

4. Which substance was the most acidic and what was its pH reading? Which was most basic and what was its pH reading?

5. Which is more accurate- the pH paper or the red cabbage juice and why?

6. Did anything in this lab surprise you? Why?