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VIDEO: Bohr Model of Atom & Bohr Model of Hydrogen Atom

Video: Energy & Light Equations

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Bohr's Model of the Hydrogen Atom

Light and Energy Class Work

Complete the followi ng problems on your own paper.
Use your reference packet!

1. Draw the Bohr Models for Hydrogen, Nitrogen & Aluminum.

2. Light with a wavelength of 525nm is green. Calculate the frequency for this green light.

3. Calculate the energy (in J) for a photon of green light from the previous question.

4. UV radiation has a frequency of 6.8×10^{15} 1/s. What is the energy (in J) for a photon of UV light?

5. What is the wavelength and frequency of a photon with an energy of 1.4×10^{-21} J?

6. A ruby laser produces red light that has a wavelength of 500 nm. Calculate its energy in joules (J)

7. As frequency increases, wavelength ___

Flame Test Demonstration

Purpose: You will use the flame tests to determine the identity of the cation in an unknown solution based on its characteristic color in flame.

Materials: Lighter, 6 small test tubes, test tube rack, tongs, 6 cotton swabs, 0.1M NaCl, 0.1M $CaCl_2$, 0.1M LiCl, 0.1M $CuCl_2$, 0.1M KCl, unknown solution

Data:

Solution	Cation	Flame Color

Diagram of the Immune Response – Teacher Copy

Lymph Node Staining for Analysis via Fluorescence Microscopy

Purpose:

The purpose of this lab is to simulate the staining of lymph node cells and the subsequent analysis using fluorescence microscopy. Students will learn how an immunologist stains lymph node cells with varying fluorescence antibodies to determine their location at different time points during an immune response to an infection.

Background:

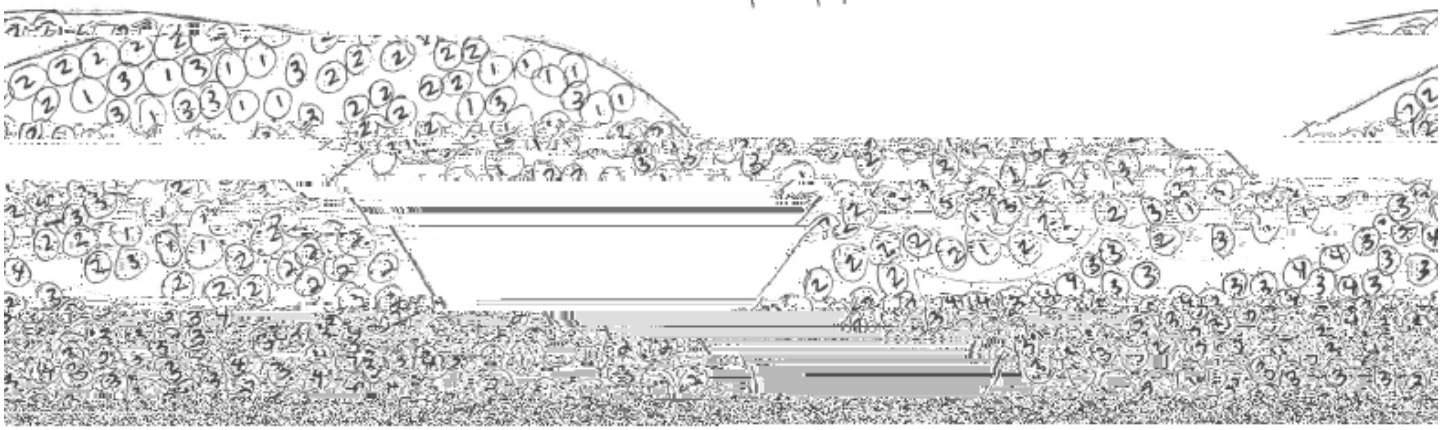
A fluorescence microscope is any microscope that uses fluorescence to generate an image. To prepare a lymph node to be viewed under a fluorescence microscope it must first be stained

Data Table:

Cell Number	Are cells fluorescing?	Probable identification of cell?	Location of fluorescing cells (T Cell Region, B Cell Region, Germinal Centers)	Indication of probable immune response state.

Lymph Node Fluorescence Microscopy – Teacher Copy

Lymph Node Fluorescence Microscopy



Flow Cytometry Experiment

Lab Set-Up

Using Flow Cytometry to Determine the State of Immune Response in a Host

Purpose:

Use a flow cytometer to identify the immune response occurring in a lymph node. Through this students will learn about the workings of a flow cytometer and the properties of light that it uses in addition to how fluorophores are used to mark lymph node cells and determine if an immune response is underway.

Background:

A flow cytometer is an instrument used mainly in the field of immunology to analyze or sort fluorophore tagged cells. A fluorophore is a fluorescent chemical compound that re -emits light upon excitation. An immunologist will stain lymph node cells with multiple fluorophore markers attached to antibodies to allow him/her to determine what cells are present at different stages of immune responses. In a flow cytometer cells are passed in single file by a beam of light that will excite the fluorophore. When a fluorophore is excited it emits a wavelength of light that is detected by a detector that recognizes that particular wavelength of light. This information is then sent to the computer for analysis and varying plots of information are able to be constructed based upon what the immunologist is looking for. Typically data is organized into scatter plots or bar graphs.

Figure 2: Schematic of a flow cytometer.
https://en.wikipedia.org/wiki/Flow_cytometry_bioinformatics#/media/File:Cytometer.svg

Materials:

Box (open top and right side) with grid paper inside (flow cytometer & detector)
Test tube filled with corn syrup (flow cell)
Brown Bag of glass gems (lymph node's cells)
Flashlight (beam of light)
Phone / Camera to video record

Procedure:

1. Set up the flow cytometer as shown in the figure 2.

2. Pick up a lymph node (brown bag) that has been stained with fluorophores.

3. Assign roles to group members.
    a. Member One: hold the flashlight 1 cm below corn syrup fill line and 0.5 – 0 cm away from the test tube of corn syrup.
    b. Member Two: find a good position to record the light being emitted from the fluorophores on the grid paper inside the flow cytometer.
    c. Member Three: record initial color observations on data sheet.
    d. Member Four: drop one lymph node cell at a time into the test tube

Data Table:

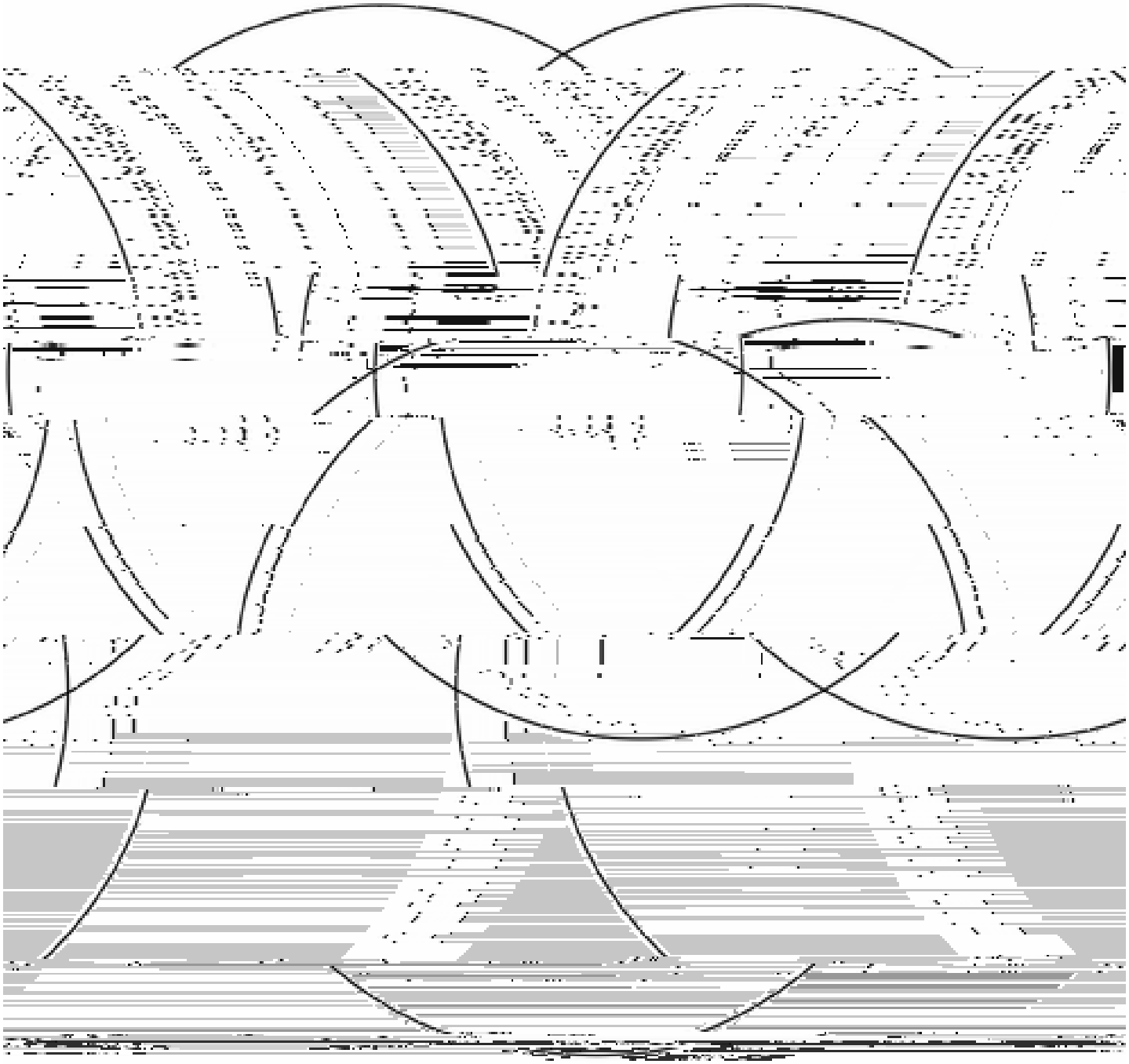
Analysis:

On graph paper, create a bar graph of number of cells and identity of cells.

Conclusion:

On back of graph paper write a conclusion summarizing the data that you collected in the lab and what you believe to be the state of immune response in the mouse's body. Remember to use your data to support your conclusion.

Venn Diagram of Flow Cytometry, Fluorescence Microscopy & Two Photon Microscopy



Text: The Basic Immune System