Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# How Does Thermal Pollution Effect Living Things?

**Purpose**

The purpose of this exercise is to determine if heated water can affect the growth of living things. The experiment will specifically determine if yeast cells can live in heated water for a short time.[[1]](#endnote-1)

**Procedure**

  **Materials**

1. Test tubes 8. Marking pencil
2. Dry yeast grains 9. Hot plate
3. Droppers 10. Blue stain
4. Test tube holder 11. Toothpick
5. Graduated cylinder 12. Slide & cover slip
6. Test tube rack 13. Light microscope
7. Clock with second hand

**Sequence of Steps**

1. Label 4 test tubes (1-4).
2. Fill each test tube with 4mL of tap water.
3. With a toothpick, add 2 grains of dry yeast to each test tube.
4. Shake the test tubes to break apart the yeast grains.
5. Put each tube in the beaker of boiling water as indicated below:
* Test tube #1 – Do not place in water
* Test tube #2 – Place in boiling water for 20 seconds
* Test tube #3 – Place in boiling water for 40 seconds
* Test tube #4 - Place in boiling water for 60 seconds
1. After putting each tube in water, return each to the test tube rack.
2. Stir the yeast cells in test tube 1 by filling and squirting dropper-full of yeast mixture 3 times.
3. Place 1 drop of yeast mixture from Test tube #1 on a clean slide.
4. Using a clean dropper, add 1 drop of blue stain to the drop of yeast mixture on the slide.
5. Mix the stain with the yeast cells by gently rotating the slide. Add a cover slip.
6. Locate the yeast cells (small dots) on low power, then on high power. Live yeast cells are round and light blue in color. Dead yeast cells are round and dark blue in color.
7. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Count the cells in the field of view. Record the cells as dead or alive in “observations”.
8. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Repeat procedure 9-12 with each of the other test tubes.
9. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Plot 2 bar graphs showing the number of live and dead cells in each tube.

**![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()**

**Observations**

1. Chart

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test Tube # | Time in Water |  # Cells You Saw | # Dead | # Alive |
| 1 | 0 sec |  |  |  |
| 2 | 20 sec |  |  |  |
| 3 | 40 sec |  |  |  |
| 4 | 60 sec |  |  |  |

1. Graph

**Conclusions:**

1. Which tube contained the most live cells? Which contained the most dead cells?
2. Why was test tube 1 not placed in boiling water for this study?
3. Using your results, write 3 statements that will explain thermal pollution:

a.

b.

c.

1. Compare the biodiversity among tubes. Is it the same or different? Why?
2. A new industry wants to move to your town. This industry wants to use water from the local river for its production line. What questions should the townspeople ask the new industry about the water?
3. How do these findings apply to agriculture production? What impact does this information have on agriculture production?

1. Agricultural Biology Curriculum Lesson Plans. Sacramento: California State Department of Education, Agriculture Education Unit, 1990. [↑](#endnote-ref-1)