Assessment Questions for

“The Perfect Brew”

### Learning Objectives:

After this activity, students will be able to:

1. describe the purpose and use of a hemocytometer.
2. describe and label the parts of a hemocytometer.
	1. describe the dimensions of the grid on the hemocytometer.
3. describe how the volume of liquid on the cytometer relates to taking up space.
	1. describe the relationship between cubic millimeter and the microliter.
	2. describe the relationship between cubic centimeter and the milliliter (ml)
4. describe how cells are visualized as dead or alive using Trypan blue.
	1. describe how cells exclude the dye from living cells and why they exclude.
	2. consider the different cell shapes and healthiness of cells.
5. describe and apply the rules of counting cells in a grid.
	1. count the cells in a given grid accurately.
	2. convert the cell count to a concentration.
	3. average the different counts from grids and determine a statistical mean.
	4. perform the calculations to determine the original concentration of cells in a sample.
6. describe the statistical rationale for the 30 to 300 rule.

# Pre-Activity Assessment questions

(LO1 and 2)

How could we determine the number of cells that are too small to see?

LO3

Imagine a cube with a volume of 1 mm3, how many of these cubes would fit into 1 cm3?

LO4 and 5

*Dilution Factor.* Suppose a 10 mL sample is diluted with 50 mL of water.  What is the dilution factor? [0.17]

*Volume and metric conversion.* Suppose the area above a square measures 2 mm by 2 mm with a height of 5 mm (or .005 m for added complexity).

What is the Volume in mm3? [20mm3]

m3? [0.00002 m3]

mL? [0.02 mL]

*Measured Cell Density.* Suppose a student counted cells in the hemocytometer described in question 2 and calculated and average cells per square to be 50.2 cells. Using the dilution factor from question 1b, what is the measured cell density in cells per mL? [6,275 cells/mL]

LO6

What considerations do we need to make when diluting a sample to look at on the microscope?

Cells must not be too dilute, we need to be able to see enough cells (at least 30) and we want the correct concentration to count, in other words we don’t want the cells too crowded. (not more than 300). We also want to be sure to mix the sample evenly.

# Post-Activity Assessment Questions

LO1 and 2

How do scientists count living cells under a microscope?

LO3

The hemocytometer area where you count cells is divided into 9 major squares, the side of each is 1 mm and the height of the cover slip in 0.1 mm. What is the volume of the space above one major square in mm3? In ml?

LO4 and 5

Suppose a 25 mL sample is diluted with 75 mL of water. what is the dilution factor?

Your cell count was 110 cells. The tube had the cells in 3 ml medium. How many cells does your tube have in total?

What is the total number of cells if you mixed 5 ul of cells and 25 ul of trypan blue before loading them into your hemocytometer?

LO6

Do you think the cells in the image you counted were in the range of 30-300?

Are these five samples comparable?