The Effect of Alcohol Concentration on the Water Content of Cells

Objective: You and your partners will conduct and analyze an experiment to explore the following question:

What effect do different concentrations of alcohol have on the water content of cells?

Materials that will be supplied:
- Graduated Cylinder
- Dialysis Tubing (acts as selectively permeable cell membrane)
- Plastic Cups (to hold your environment solutions & dialysis tubing bags)
- Tap water
- 4% Ethanol solution (approximate beer alcohol content)
- 10% Ethanol solution (approximate wine alcohol content)
- 50% Ethanol solution (approximate hard liquor alcohol content)
- Electronic Balance
- Dialysis Tubing clamps
- Stirring Rod
- Saran Wrap & Rubber bands (to cover your cups)

Procedural information:

LABELING THE PLASTIC CUPS
1. Obtain 4 plastic cups.
2. Using a sharpie marker and masking tape, label one cup tap water.
3. Using a sharpie marker and masking tape, label one cup 4% alcohol solution.
4. Using a sharpie marker and masking tape, label one cup 10% alcohol solution.
5. Using a sharpie marker and masking tape, label one cup 50% alcohol solution.
6. Write the initials of someone in your group on each of your cups for identification.

FILLING PLASTIC CUPS
1. Fill each cup 100ml of the appropriate solution and set aside.

PREPARING DIALYSIS TUBING
You will be creating cell models using dialysis tubing. Dialysis tubing is a thin plastic material that acts as a selectively permeable material that will allow water to pass while preventing the passage of most solutes. To prepare the dialysis tubing:
1. Obtain a 20 cm length of dialysis tubing which has been soaked in distilled water.
2. Using clean hands, open the dialysis tubing by rubbing the membrane back and forth between your thumb and forefinger.
3. Twist one end of the dialysis tubing at approximately 2 cm from the end.
4. Secure the end with the dialysis tubing clamp, rubber band or tie the tubing off.
5. Pour 10 mL of tap water into the open end of the dialysis tubing.
6. Twist the open end of the dialysis tubing and secure with another clamp. Be sure that the “cell” is not too tight. If there is not some open space inside the “cell” water will have a more difficult time passing into and out of the cell.

MEASURING THE DEPENDENT VARIABLE
1. Measure the mass of the filled dialysis bags and record your results in your data table. Copy this data table:

% Alcohol Concentration | Initial Mass (g) | Final Mass (g) | % change (F-I/I)
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2. Be sure that the outside of the dialysis tubing bag is GENTLY blotted dry before massing. Remember—even tiny drops of water have mass!

FINAL PREPARATION
1. Place a dialysis tubing “cell” into each of the four environments.
NOTE: It is very critical that you record the mass of the correct bag that you placed in a specific environment. All of your bags will have different masses!
2. Cover with Saran Wrap and secure with a rubber band.
3. Let all four cups sit overnight.

Day #2: Remove each bag (one at a time!!!!), gently blot dry and mass the cell. Record the data in your table.