

**IV Drips: Making Molar Solutions**

Typically, it is the pharmacist’s role to prepare a patient’s medication, whether that medication is in the form of a tablet or in the form a **solution**. A solution is comprised of a **solute** and a **solvent**. A solute is a substance (often a solid or liquid) which has dissolved, or dissociated, within another substance. A solvent, which is also called a **diluent** in the healthcare field, is the substance or medium that is doing the dissolving. Whether a researcher has a career in biotechnology, in biomedical, or in clinical healthcare, he/she will likely at some point have to make their own molar solutions.

**Lab: The Bear Necessities**

Not every solution needs to be a $1 \text{ M}$ concentration and, sometimes, making a 1 liter solution will be too much volume for your needs. In the following procedure, you will be making 50-mL solution and observing the effects on a gummy bear. Depending on the tonicity of the system between the gummy bear and the solution, the gummy bear could change in size.

**Hypertonic**: the concentration of solute in the solution is greater than the concentration of solute in the gummy bear

**Isotonic**: the concentration of solute in the solution is equal to the concentration of solute in the gummy bear

**Hypotonic**: the concentration of solute in the solution is less than the concentration of solute in the gummy bear

**Objective**: Students will be able to make molar solutions and analyze their tonicity.

**Materials**

| 6 plastic cups | labeling | 50-mL graduated cylinder | balance |
| DI water | 6 gummy bears | 3 250-mL beakers | weighing boat |
| corn syrup | stirring rod | spatula | sucrose |

Modified from HASPI IV Drips Activity
Procedure
1. Label your plastic cups with a letter A, B, C, D, E or F and your group name.
2. Using the balance, weigh one gummy bear and record its mass in grams in the data table below Cup A and beside Mass of Gummy Bear (Day 1). Place this gummy bear in Cup A. Weigh the second gummy bear and record its mass in grams in the data table and place it in Cup B. Continue until you have weighed and recorded the mass of each gummy bear and placed 1 gummy bear into each cup.
3. Measure 50-mL of DI water using the graduated cylinder and pour into Cup A.
4. For Cup B, you will need to make 50-mL of 0.1 M sucrose solution. Pour the solution into Cup B.
5. For Cup C, you will need to make 50-mL of 1 M sucrose solution. Pour the solution into Cup C.
6. For Cup D, you will need to make 50-mL of 2 M sucrose solution. Pour the solution into Cup D.
7. For Cup E, you will be adding 50-mL of corn syrup, which has a concentration of 5 M.
8. For Cup F, there will be no solution added.
9. Place your cups in a cool, safe place overnight.
10. On Day 2, make observations of your gummy bears in your data table. Then, using a balance, place one gummy bear in a weighing boat at a time and record its mass in the data table below. Determine tonicity.

<table>
<thead>
<tr>
<th></th>
<th>Cup A (0 M)</th>
<th>Cup B (0.1 M)</th>
<th>Cup C (1 M)</th>
<th>Cup D (2 M)</th>
<th>Cup E (5 M)</th>
<th>Cup F (no M)</th>
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</thead>
<tbody>
<tr>
<td><strong>Mass of gummy bear (Day 1)</strong></td>
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<td><strong>Mass of gummy bear (Day 2)</strong></td>
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<td><strong>Observations of gummy bear (Day 2)</strong></td>
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<tr>
<td><strong>Tonicity (hyper, iso, or hypo)</strong></td>
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Lab: IV Inquiry
At the front of the classroom are samples of bags containing two different IV fluids. Using the equipment available (graduated cylinders of various sizes, beakers of various sizes, hot plate, stirring rod, balance, thermometer), devise a plan to determine whether or not the concentrations for each bag are correct.

*Magnesium sulfate is administered to women who are experiencing preterm labor or pre-eclampsia (pregnancy-induced high blood pressure). Magnesium sulfate is thought to slow uterine contractions by blocking the release of calcium to uterine muscles as well as prevent seizures in pre-eclampsia patients.

*When diabetic patients experience low blood sugar, a dextrose solution (DSW) may be administered. Dextrose is a form of glucose (C6H12O6) and is utilized by the body cells for basic metabolic needs (cell respiration).