

### Fact Sheet: How to Use Vinegar to Imitate Acid Rain

As you know from your reading, acid rain is not vinegar. But vinegar is an acid, and you can use it to create a solution that is like acid rain. You and your teammates will need more facts.

1. How acidic should the imitation acid rain be? Here are the facts:
  - “Normal” rain has a pH of 5.6.
  - Acid rain is anything with a pH of less than 5.6.
  - Vinegar has a pH rating of 3.0.
  - To make an imitation acid rain with a pH of 4.0, you need to dilute the vinegar with water (make it weaker). For example:  
20 ml (4 tsp) of vinegar + 2 liters (2 qt) of water = imitation acid rain with a pH of 4.0
  - Remember, the water you begin with may have a different pH from that of normal rain. Keep this in mind when you decide how much vinegar to add. You may want to test your water’s pH before deciding on your solution.
2. Now that you know the facts, discuss with your group how to set up your own experiment.
  - Decide how acidic to make your rain.
  - Figure out how much rain needs to fall each time so that it definitely gets into the aquatic ecosystem, too. Remember that you should use about the same number of dropperfuls of water that the class has been using throughout the unit to water the ecocolumn. Simply count the number of dropperfuls of pollutant solution until it begins to come out of the opening of the terrarium.
  - Decide how often you will schedule an acid-rain shower. Water the ecocolumn as often as the class did before. Remember, you don’t want to overwater the terrarium.
  - Set up a recordkeeping system to keep track of this information on a daily basis (for example, a chart, calendar, or diagram).

### Fact Sheet: How to Use Plant Fertilizer to Imitate Agricultural Runoff

As you know from your reading, agricultural runoff is not just chemical fertilizer. It may also include animal manure, a rich, natural fertilizer. In your experiment, you will use a fertilizer that contains many of the nutrients in both kinds of runoff.

1. How rich in nutrients should the imitation agricultural runoff be? Here are the facts:
  - The recommended dose is 2.5 ml ( $\frac{1}{2}$  tsp) of fertilizer to 2 liters (2 qt) of water.
  - In some areas, about 10 times the recommended dose washes into the water system. This means you would add 25 ml (5 tsp) of fertilizer to 2 liters (2 qt) of water.
2. Now that you know the facts, discuss with your group how to set up your own experiment.
  - Decide how much fertilizer you will use.
  - Figure out how much fertilizer you will add each time to make sure the runoff enters the aquatic ecosystem. Remember that you should use about the same number of dropperfuls of water that the class has been using throughout the unit to water your ecocolumn.
  - Decide how often you will create runoff. Water the ecocolumn as often as the class did before. Remember, you don't want to overwater your terrarium.
  - Set up a recordkeeping system in order to keep track of this information on a daily basis (for example, a chart, calendar, or diagram).

### Fact Sheet: How to Use Salt to Imitate Road Salt

The reading selection explained how we use road salt to melt ice and snow on the roads in the winter. Later, this road salt enters the soil at the side of the highways and runs off into water systems.

1. How salty should your experimental mixture be? Here are the facts:
  - The soil at the edge of the highway is the most heavily polluted. There you could find up to 6 ml (approx.  $1\frac{1}{4}$  tsp) of salt to 1 liter (1 qt) of water.
  - At about 9 m from the road, expect to find about 5 ml (1 tsp) of salt to 1 liter (1 qt) of water.
  - At about 18 m from the road, you might find up to 3 ml (approx.  $\frac{3}{4}$  tsp) of salt to 1 liter (1 qt) of water.
2. Now that you know the facts, discuss with your group how to set up your own experiment.
  - Decide how salty to make your solution.
  - Figure out how much salt and water solution you will add each time to make sure the runoff enters the aquatic ecosystem. Remember that you should use about the same number of dropperfuls of water that the class has been using throughout the unit to water your ecocolumn.
  - Decide how often you will apply the salt and water solution. Water the ecocolumn as often as the class did before. Remember, you don't want to overwater your terrarium.
  - Set up a recordkeeping system in order to keep track of this information on a daily basis (for example, a chart, a calendar, or a diagram).

**Record Sheet 10-A**

**Team Members**

Name: \_\_\_\_\_

Name: \_\_\_\_\_

Name: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Planning Worksheet**

1. The pollutant we are testing is \_\_\_\_\_ . We will make it by mixing \_\_\_\_\_ with \_\_\_\_\_ water. We will add \_\_\_\_\_ of \_\_\_\_\_ to our experimental ecocolumn \_\_\_\_\_ times per week.

(amount of pollutant) (amount of water)

(amount, in dropperfuls) (pollutant solution)

2. The question we will try to answer is:

\_\_\_\_\_

\_\_\_\_\_

3. To make our experiment a fair test, these are the things that we will not change:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. We will observe our experimental ecocolumn every day and record our observations. These are some of the things we will look for in our observations:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Record Sheet 10-A**

**Planning Worksheet** *(continued)*

5. This is our prediction about what will happen to the plants and algae in our team's ecocolumn:

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6. This is our prediction about what will happen to the plants and algae in the class control ecocolumn:

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7. We think these things will happen because:

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**Note:** Give this completed sheet to your teacher.