

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

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

Period: \_\_\_\_\_

## Plant Extracts

Plant extracts can be used for scientific testing, to find out what nutrients or chemicals are in the plant. Plant extracts are also used in some beauty products (shampoos, soaps, perfumes), medicines, or food flavoring (like vanilla extract). For safety, do not ingest any extract you make, since you do not know what chemicals are present in the plant and many plant chemicals are poisonous.

### Materials:

- 10 g fresh plant material
- 350 ml of distilled or spring water
- enamel or stainless steel pot
- coffee filter
- string
- hot plate or stovetop
- pot holder
- clean glass bottle with cover and label
- metric scale

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

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

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

### Plant Extract

Warning: Do Not Ingest!

### Procedures:

1. Place 10 grams of fresh plant material into the coffee filter. Gather and tie the top of the filter to form a "tea bag."
2. Put the tea bag in a clean jar and clearly label the jar with your name, the plant name, the date, and the phrase "warning: do not ingest" (see above box).
3. Bring 350 ml of water to a rolling boil in the pot. Using a potholder to handle the pot, carefully pour the water into the jar until it is full. (Note: your teacher may prefer to do this for you).
4. Cover the jar and let it sit for an hour so the water cools and the tea brews. Swirl the jar once or twice during that time.
5. Press the moisture from the tea bag into the jar then remove. Seal the jar, and refrigerate.



The following labs are reproduced or adapted from:

Paye, Gabriell DeBear, 2000. Cultural Uses of Plants: a guide to learning about ethnobotany. New York Botanical Garden Press, New York.

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## Testing Your Extract

### PI-antibiotics: Does your Plant Have Anti-Bacterial Properties?

In this experiment we will find out if your plant extract has the ability to kill the bacteria that turns milk into yogurt (like *Lactobacillus acidophilus* and/or *L. bifidus*). These helpful bacteria enhance digestion and are good for you. If your plant is able to kill or inhibit the growth of these bacteria, there is a possibility that it may also be effective in controlling harmful pathogenic bacteria. If so, your plant might be a candidate for further research as a potential antibiotic drug for the future.

#### Materials:

- Your plant extract – fresh, less than 2 days old
- Three grams (approx. 1 teaspoon) of plain all-natural yogurt with active cultures added (note: lots of name brand yogurts, such as Dannon, do not have active cultures make sure your yogurt has active cultures)
- 500 ml (approx. 1 pint) of fresh milk Two sealable glass containers at least 500 ml (1 pint) in size
- Masking tape
- Marker
- Beakers or graduated cylinder for measurement
- Scale (if being exact)

#### Procedures:

1. Put 3 grams (approximately one teaspoon) of plain yogurt into a sealable container with 500 mL (about one pint) of milk. Shake the container so the milk and yogurt mix thoroughly. This is known as *inoculating*, or infecting, the milk with the bacteria.
2. Form a hypothesis. Do you believe your plant extract will inhibit the growth of bacteria found in yogurt?
3. Put half (250 mL) of the inoculated milk into each of the glass containers. Use masking tape to make labels for each container. Label one of them "Control, no plant extract" and the other one "experiment, contains [plant name] extract." Also put your initials and the date on each label.
4. Add 25 mL of your plant extract to the experimental glass container and 25 mL of water to the control container. Gently swirl the containers to mix the contents together.
5. Cover the containers and put them together in a warm place (the warmer the milk, the faster the bacterial will grow- but be careful! The room should not be too hot).
6. Every day for the next 5 days, check the containers and examine the thickness of the mixture. The thicker the mixture, the more bacteria have grown in it. Record your findings.
7. When your experiment is over, wash and recycle the glass containers.



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## Plant Tinctures

Tinctures are similar to extracts, but use alcohol solution rather than hot water. Tinctures can be used to make perfumes, incense, and dyes. Tinctures prepared from ingestible forms of alcohol can be used medicinally. For this lab we are using rubbing alcohol, therefore the contents should not be ingested under any circumstance.

### Materials:

- 5 g of the plant part you want to test (brightly colored or aromatic flowers, fruits, roots, or leaves work well)
- mortar and pestle or blender
- rubbing alcohol
- pot with water
- hot plate or stovetop
- dropper
- metric scale
- cheese cloth or coffee filter
- small clean glass bottle with cover and label

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

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

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

### Plant Tincture

Warning: Do Not Ingest!

### Procedures:

1. With the mortar and pestle, grind the plant part you want to test or put plant material in blender. Grind or blend 5 grams of fresh plant material.
2. Heat the rubbing alcohol in a water bath until it reaches a boil.
3. Place 10 ml of the hot rubbing alcohol into the mortar or blender (your teacher may prefer to do this for you) and continue to grind/blend the plant with the alcohol. This will release the plant pigments into the alcohol solution.
4. Let the mixture cool for ten minutes.
5. Place the contents onto cheesecloth or a coffee filter and squeeze it or let it drip into a jar to extract the liquid. Store the tincture in a glass bottle or jar, sealed securely so that the tincture doesn't evaporate.
6. Clearly label the bottle with the contents, your name, the date, and the words "warning: do not ingest."



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## Testing Your Tincture

### Plant Pigments: Paper Chromatography Test

This experiment will allow you to separate some of the pigments hidden in your plant. The following information may help you identify some of the compounds you see:

Chlorophyll A = bright green

Chlorophyll B = dull or khaki green

Carotenoids = lemon yellow to orange

Anthocyanin = pale pink, red, purple or blue

Xanthophyll = yellow

#### Materials:

- |   |   |
|---|---|
| <input type="checkbox"/> Black marker   | <input type="checkbox"/> Solvent made of 20 ml water, 20 ml rubbing alcohol, and 5 ml vinegar |
| <input type="checkbox"/> Your plant tincture (suggestions: spinach, carrot, red cabbage, or colorful flowers) | <input type="checkbox"/> Metric ruler   |
| <input type="checkbox"/> Pieces of coffee filter paper cut into strips 1 cm wide and 12 cm long               | <input type="checkbox"/> One medicine dropper for each tincture you will test                 |
| <input type="checkbox"/> Test tubes   | <input type="checkbox"/> Pencil   |
|   | <input type="checkbox"/> Test tube holder   |

#### Procedures:

1. Make a tiny pencil mark 2 cm from the bottom of each of the filter papers. This is where you will place your pigments.
2. With the marker make a dot, about the size of a pencil eraser, on the tiny pencil mark you made on one of the filter strips.
3. For each plant tincture you wish to test, use a separate medicine dropper and strip of filter paper. Now place a drop of the plant tincture on the tiny pencil mark of another filter strip. Let the drop of tincture dry, then place more tincture directly over it. Repeat this step 4 times.
4. For each of the filter papers, prepare the test tube by pouring the solvent until it reaches 1 cm high.
5. Place each of the marked filter papers into separate test tubes. Press the papers down to the bottom of each tube so the solvent can be absorbed by the paper. The solvent should not touch the pigment. Keep the test tubes upright in a test tube holder.
6. Observe the filter paper as the pigments begin to separate in each test tube. It usually takes 20 to 60 minutes for the pigments to fully separate.
7. Once the pigments have fully separated, take them out of the test tubes and place them on a sheet of paper or a tray to dry.

