

Compost Creations

Grade: 1-2

Time: 1.5 hours

Activity Overview :

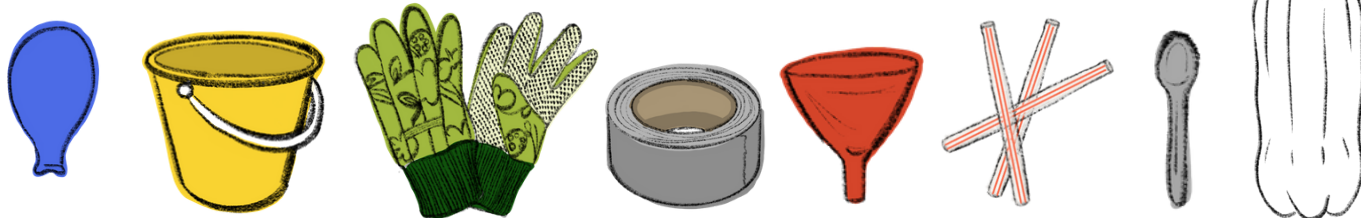
Today we are going to learn about what it means to compost materials and why it is important! To learn about the compost process, we are going to set up an experiment to see how much methane and carbon dioxide gas is produced by your compost. Then, we are going to use the compost you create in this experiment to fertilize your garden or houseplants. While you are creating a small amount of flammable gas in this experiment, it is not enough to be dangerous. To be safe, keep your experiment away from flames or sparks.

Before we begin think about the following questions:

- What do you think it means for something to compost?
- What kind of things do you put in your compost bin at home?
- Why do you think is important to compost?

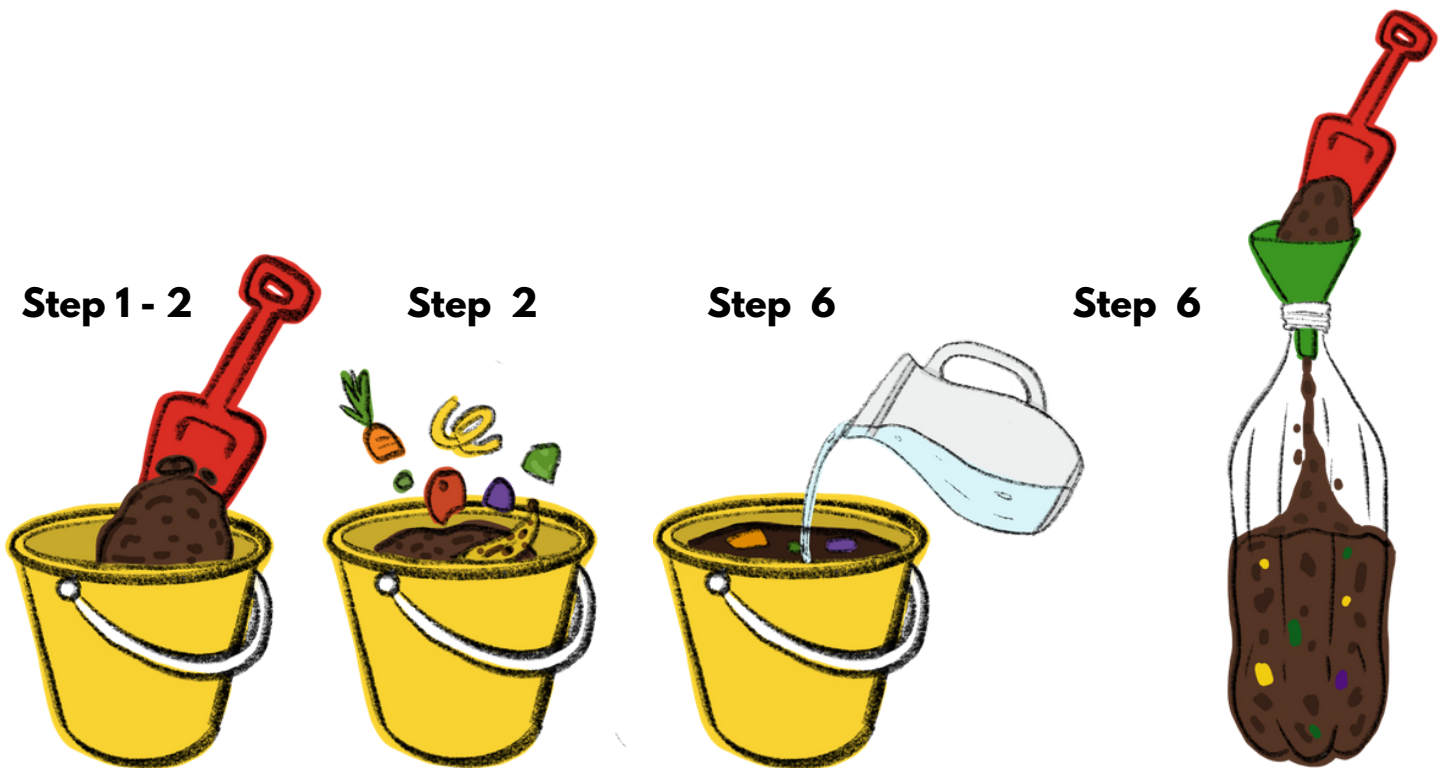
Materials:

- Two-liter plastic water bottle (1)
- Water (distilled works best)
- Plastic straw
- Black paper
- Balloon (1)
- Duct tape
- Household compostable material (vegetable scraps)
- Natural soil or manure (the bacteria source)
- Large spoon
- Bucket or large bowl (one you can get dirty)
- Garden gloves (optional)
- Electric drill (optional)
- Funnel (optional)



Activity:

- 1** Put on your gardening gloves and go outside into your garden!
- 2** Scoop up $\frac{1}{2}$ a cup of soil using your spoon and place it in your bucket or bowl. You want to use dark soil that has a lot of organic material or manure as this will be the bacteria source for your compost experiment.
- 3** Cut up 1-2 cups of vegetable scraps into small pieces and put them into your bowl with the soil.
- 4** Pour 1 L of distilled water into your bucket or bowl and mix everything together until all the chunks are broken up.
- 5** Pour the compost mixture carefully into the 2 L bottle (use a funnel if you have one). Do not fill the bottle up to the top, leave about 5 cm of empty space.



Activity:

- 6 Cover the outside of the bottle with black paper to keep light out.
- 7 Drill a hole in the bottle cap the same size as the straws you are using. If you do not have an electric drill or screwdriver to do this, you can use duct tape to seal the bottle with the straw coming out of the bottle.
- 8 Screw the bottle cap onto the bottle and place the straw through the hole, making sure it is a few centimetres above the mixture. Securely tape the straw to the bottle cap (or top of the bottle if you were not able to make a hole).
- 9 Make sure that the straw is not squished in any places, that would prevent gas from travelling through it.
- 10 Place the balloon on the end of the straw sticking off the top of the bottle, tape the balloon securely to the straw so that no gas can escape. Make sure not to squish the straw.
- 11 Place the compost experiment somewhere warm but away from any open flames or sparks.
- 12 Let the compost experiment sit for 3-6 weeks. During this time, the balloon should start to fill up with gas. The gases in the balloon will be carbon dioxide, which is not flammable, and methane, which is flammable. This gas is produced during the decomposition process because of the living organisms, bacteria, which are in the soil.
- 13 When you are ready to use your compost, make sure you release the gas you collected in the balloon outside.

Step 6



Step 7 - 9



Step 10



How to use your compost

Compost is a great material full of nutrients plants need to grow. It is also a great way to use your vegetable and fruit scraps rather than putting them to waste!

The compost you made can be used in a variety of ways to help your plants grow. Here are some ways you can use your compost:

- Mix the compost into your vegetable garden beds before you plant any vegetables this spring or summer. Break up the soil in your garden bed with a shovel or trowel, sprinkle in some compost and then thoroughly mix the soil. The compost you add will provide lots of nutrients for your vegetables and will help them grow.
- Mix the compost into your flower beds. If you have perennials (plants that grow more than one year) very carefully break up the soil around your flowers or bushes then mix in the compost around them. Do this in the springtime before they bloom.
- Rake compost around your trees or larger plants. If you want to give your trees a little boost of nutrition, you can rake the soil around them, sprinkle some compost around them, and rake it in.
- Sprinkle some soil on your lawn before it starts to grow. Sometimes grass can take some time to grow after the wintertime. By sprinkling some compost on your grass before it starts to grow in the spring can help it grow strong and healthy.
- Reinvigorate your indoor plants with some compost! If you see your indoor plants are looking a bit wilted or unhappy, it may be because the soil in their pot is lacking the nutrients they need to stay healthy (this can happen over time if you do not mix in any fertilizer into their soil. Gently break up the soil around your plant, careful not to damage the roots. Sprinkle in some compost and mix it in with the original soil.

Engineering and Science Connections

Compost is the rotting and decay of organic material such as leaves, vegetable peels, teabags and fruit waste. It is often used as a **fertilizer** as it provides many essential nutrients that improve soil conditions for plant growth. Compost produces **carbon dioxide** and methane gas. Carbon dioxide and **methane** are two common gases that are released through the breakdown of organic material that occurs in compost.

Fertilizer is a chemical or natural substance that is added to soil to help plants grow. It works by providing essential **nutrients** to plants and by improving the soil by helping it retain more water and allowing air to flow freely.

Nutrients are a substance that are needed for healthy growth and development. Fruits and vegetables contain many important nutrients. Nutrients get into soil in many different ways such as the **decomposition** of animal waste and dead plants.

Decomposition is the process of being broken down into simpler things by living things such as **bacteria** and fungi. This process is very important to all ecosystems. Decomposer microorganisms, such as **bacteria** will feed off of the organic material and break into its simplest parts. Any leftover nutrients from this process are released into the soil to help plants grow.

Extensions

Start a large-scale compost project in your garden!

If you enjoyed making compost for your garden or houseplants in this experiment, you can create a larger-scale version in your own backyard. This compost heap produces much more than our small experiment and can be continuously fed over years. These compost heaps are a bit more work than the experiment you just did, but they are a great way to use your fruit and vegetable scraps and have a constant source of fertilizer for your garden or house plants!

- Set aside an area in your garden where you want to start your compost pile, it's helpful to have a plastic or wooden box with a lid that you make your compost in.
- The large-scale compost pile uses the same "ingredients" as the experiment. You will need to first put some soil into the compost bin that is rich with organic material. Mix in your fruit and vegetable scraps and add some water.
- Whenever you add in materials into the compost bin, it is helpful if you break them up into smaller pieces, this will speed up the decomposition process.
- When you are making larger amounts of compost, there are a few things you need to keep in mind in comparison to smaller amounts.

Extensions

- You want to keep the compost mixture moist, but not wet. It is helpful to have a lid on the bin so it does not get soaked when it rains. Check on your bin periodically and water it when it looks dry.
- It is not good to add animal products into this type of compost bin.
- It is good to add materials like grass clippings, raked leaves, wood chippings, or straw into this type of compost bin.
- Check on your compost every one or two weeks and mix it so you incorporate air into it, this will help the bacteria doing the decomposition do their work!
- Over time, the compost will all turn into a brown colour and will be crumbly in texture with many many small pieces. Any large pieces you can leave in the bin and you can use the finer compost to fertilize your garden beds or houseplants.
- Continue adding organic material to your compost bin, watering it lightly, and mixing it.
- A composite bin like this can be continuously “fed” and can be kept going this way for years!

Share your creations!

Don't forget to share your experiments and creations with us! We would love to see what you've made. You can Email us at: esqinfo@uwaterloo.ca or send us a message/tag us on our social media!

Facebook: @uwengoutreach

Twitter: @UWEngOutreach

Instagram: @uwengoutreach

Thanks for exploring, discovering, and learning with us!

3, 2, 1 Done!

3 - Write or draw 3 things you learned from this activity

2 - Write or draw 2 things you found super interesting or cool and want to learn more about

1 - Do you have any questions about the activity? Did something make you wonder...what if? how? or why?