



2020 Minor Challenge Set #1

STEM Field: Environmental Engineering

Level: Junior

Challenge Name: Making Compost

Duration: 2-4 weeks, depending on input material

Materials required:

- Clip-lid glass jar; or a large clear container with a lid
- Plant matter (e.g. leaves, grass clippings)
- Fruit and vegetable scraps
- Small cup (for measuring quantities)
- Soil or potting mix (optional)

Safety:

- Use personal protective equipment (PPE) such as gardening gloves and a dust mask or respirator when handling compost.
- Take care not to inhale loose dust, and ensure to wash hands with soap after handling composting materials.
- Set up experiment outdoors in a well-ventilated area.

Introduction:

Instead of throwing out unwanted food into landfill, what if we could turn it into something useful instead? **Composting** transforms natural material (e.g. vegetable scraps and plant matter) into a soil-like material: the **compost**. This is possible due to the process of **biodegradation**, where organisms such as bacteria, fungi and earthworms break down

the natural material into its most basic parts.



A related idea is **biodegradability**, which describes how easily a material can be broken down by organisms (i.e. biodegraded).

In this experiment, we will be starting our own compost to try and reduce waste. Before we begin: what types of household material do you think will biodegrade quickly? What types do you think will take longer to break down?

Instructions:

- 1) Wash and dry your glass jar (or container) well to remove any residues.
- 2) Prepare your fruit and vegetable scraps by tearing them into smaller portions. An adult can help to cut these into smaller pieces.
- 3) Add the scraps and plant matter to your jar, and then add in an equal portion of water. Use the cup to help measure out the quantities equally.

If you have soil or potting mix, add an equal portion to the jar.

- 4) Observe and record the changes in the material each day, over the course of 2-4 weeks. Add water as required, but be careful not to add too much as this can cause a different kind of biodegradation to occur, and can end up very smelly!

If the mixture is too watery, ask an adult to help pour off the excess water, and then add in dry plant material.

Extension - Compost Research

Do some research by looking at trustworthy websites such as those recommended under 'Learn More! Resources' below and look up the types of scraps you composted. How does the time taken for your scraps to biodegrade compare to the time taken as suggested by these websites? In this challenge we've explained what composting is and that it is useful, but how can we use compost? Answer this question using more research.

Reflection Questions:

- What were the problems associated with the challenge? Are there any improvements you could suggest?
- What are the key concepts of science and engineering that relate to this challenge?
- Which materials broke down the quickest over the 2-4 week period? Which materials took longer, or stayed intact? Describe why.
- No earthworms were added to this compost, however you would have observed some biodegradation? What kind of organisms might have caused this?

- What might change in the experimental results if earthworms were added to your compost?
- What effect might the addition of soil or potting mix have to the compost? If you completed this step as part of your set up, draw on your own experimental results to support your answer.
- Have a look at the table below and see how long it takes common materials to decompose. Do you notice a pattern between natural and manufactured material?

Approximate biodegradation time for items left in the environment¹

Vegetables	5 days –1 month
Paper	2–5 months
Cotton T-shirt	6 months
Orange peels	6 months
Tree leaves	1 year
Wool socks	1–5 years
Plastic-coated paper milk cartons	5 years
Leather shoes	25–40 years
Nylon fabric	30–40 years
Tin cans	50–100 years
Aluminium cans	80–100 years
Glass bottles	1 million years
Styrofoam cup	500 years to forever
Plastic bags	500 years to forever

¹ (Science Learning Hub, 2019)

Submission Guidelines:

- Submit a photo of the experiment setup. Include a short summary that addresses the Reflection Questions.
- In 2020 we have changed our submission guidelines compared to 2019. To submit fill out the form here:
<https://forms.gle/ChrCXLud97E4x3AT9>

Learn More! Resources:

- Better Health Victoria - Gardening - Making Compost
<https://www.betterhealth.vic.gov.au/health/healthyliving/gardening-making-compost>
- Sustainability Victoria - Compost
<https://www.sustainability.vic.gov.au/You-and-your-home/Waste-and-recycling/Food-and-garden-waste/Compost>

Sources:

- Science Learning Hub. (2019). *Measuring biodegradability*. [online] Available at:
<https://www.sciencelearn.org.nz/resources/1543-measuring-biodegradability> [Accessed 2 Mar. 2019].
- Growing With Science Blog. (2019). *Compost Science Projects for Kids*. [online] Available at:
<http://blog.growingwithscience.com/2016/03/compost-science-pr>

[objects-for-kids/](#) [Accessed 2 Mar. 2019].

Images:

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