**ACTIVITY: Biodegradability experiment**

**Activity idea**

In this activity, students set up an experiment to determine the biodegradability of different substances.

By the end of this activity, students should be able to:

* organise a group of items into categories
* carry out a simple experiment
* understand that some materials are biodegradable and others aren’t
* explain what might affect how quickly something degrades
* make predictions about the biodegradability of materials.

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**Introduction/background**

This experiment explores the concept of biodegradability. Before carrying it out, make sure students are familiar with the meaning of the term by going over the Science Ideas and Concepts article [Biodegradability](http://link.sciencelearn.org.nz/resources/1537-biodegradability).

This experiment can be done in groups, with each group given the same or different items from the list below, or each group could be assigned two materials to compare, for example, plastic versus cardboard.

**What you need**

* Spades or trowels
* 100 x 100 mm pieces of each of the following:
	+ Plastic foam (from a plate or a meat tray)
	+ ‘Biodegradable’ plastic shopping bag
	+ Plastic shopping bag
	+ Cardboard
	+ Thin woven cotton fabric
	+ Piece of lettuce/cabbage leaf
	+ Aluminium foil
* Coloured marker pegs
* Sheets of acetate with a fine grid (5 mm squares) copied onto it
* Whiteboard pens
* Copies of the student handout [Investigating biodegradability](#handout)

**What to do**

1. Decide in advance where you will be able to dig small holes in soil and leave them undisturbed for 2 weeks. It might make it easier to dig the holes if you water the area a couple of days beforehand.
2. Divide your class into groups and give them a set of the materials to be tested and a copy of the student handout [Investigating biodegradability](#handout).
3. Have students follow the instructions in Part 1 of the handout. Students start by putting the materials into categories – it is up to them how they do this. They can use criteria such as type of material but do not base the categories on possible biodegradability.
4. Two weeks later, have students carry out the instructions in Part 2 of the handout.
5. Collate the data from the groups and create a graph.

**Discussion questions**

* Which materials were the most biodegradable?
* Which materials were the least biodegradable?
* Were the results the same for each group?
* If your results were different, what do you think might have been the reason?
* What were your conclusions for this experiment?
* How would you design this experiment differently next time?
* What variables might affect biodegradability? (Temperature, moisture, length of time, type of ground buried in.)

**Student handout: Investigating biodegradability**

Names of people in group:

***Part 1***

1. Your group has a number of pieces of different materials. Organise them into categories – you decide how to do this, but don’t base it on biodegradability. List the materials in their groups:
2. You will be shown where to dig a hole for your investigation.
* Dig a 300 x 300 mm square hole about 100 mm deep.
* Place the material samples in the hole so that they are not resting on top of each other.
* Cover the samples with soil.
* Place a marker over the samples so that you can find them when it is time to dig up them up in 2 weeks’ time.
* Wash your hands.

***Part 2 (2 weeks later)***

1. After 14 days, return to the site and carefully dig up the samples. Carefully place the samples on a tray or in a box lid to carry them inside. Take care, as some samples may tend to fall apart.

1. Place the 100 x 100 mm clear plastic acetate grid over each sample. Use a whiteboard pen to mark each square on the grid where the material is changing or breaking down. Count the squares marked and record the number for each material in the table below.

|  |  |
| --- | --- |
| **Name of material** | **Number of squares showing change** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

1. Group your most biodegradable items and your least biodegradable items together. What do you think links these items?
2. Of the categories you placed the materials in for Part 1:
* What was the most biodegradable category?
* What was the least biodegradable category?
1. Based on what you have found out, predict how biodegradable the following items might be in the table below.

|  |  |  |
| --- | --- | --- |
| **Item** | **Not biodegradable** | **Biodegradable** |
| Sheet of paper |  |  |
| Sheet of plywood |  |  |
| Cotton sock |  |  |
| Synthetic sock |  |  |
| Paper plate (waxed) |  |  |
| Fizzy drink can |  |  |
| Plastic bottle |  |  |