

## EXEMPLAR PROJECT WRITE-UPS

### Project 1

## BIO-DEGRADABLE AND NON-BIO-DEGRADABLE WASTES

### AIM



To identify bio-degradable and non bio-degradable materials (wastes) in the environment.

### THEORY



It is important to recognise that the terms like bio-degradable and non-biodegradable materials referred herein pertain to 'wastes' produced by human activities. These 'wastes' if not disposed off efficiently will cause excessive accumulation and pollute water, land and soil. The wastes range from human and farm excreta, industrial sewage, pesticides and herbicides, empty cans, bottles and jars, metal and plastic cups, polythene bags and jars, paper, discarded machinery parts etc. Wastes also accumulate in the form of refuse from kitchen and vegetable markets, gardens, agricultural and farm lands etc. The list is very long but for the sake of convenience and from ecosystem point of view wastes are categorised into bio-degradable and non bio-degradable. In an ecosystem apart from producers and consumers there is another group of heterotrophic organism collectively referred to as decomposers that consist chiefly of bacteria and fungi which degrade and digest dead plant and animal material? All such materials which are degraded and decomposed by decomposers are called bio-degradable wastes. Such wastes are easily manageable by a natural process or in an engineered system (for example waste treatment plants) and can be turned into useful resources (for example, bio-gas, plants etc). A large variety of waste materials produced by man and industry, however, don't degrade (polythene, plastic, glass etc) or are degraded only very slowly by decomposers (for example DDT). Such wastes are called as non bio-degradable materials. Their constant accumulation especially in highly populated urban areas is proving to be a great health hazard and a biggest obstacle for clean living. This study is aimed to distinguish between the two types of materials.

## MATERIALS REQUIRED



Sample of waste materials available in the garden, kitchen, market, cowshed etc. a spring balance, a pair of hand gloves, two plastic bags, (10" × 6"), and nylon thread.

## PROCEDURE



1. Collect a handful of following samples from your nearby surrounding. Use a pair of gloves while handling the samples to prevent injury or infection. The samples could be vegetable matter, animal and fish remnants, bamboo pieces, card board pieces, straw, paper, leaves, pieces of glass, cow-dung, pieces of cloth, food leftovers, twigs, bark, thermoplastic wastes, fruit peelings, cigarette butts, pieces of plastic plates, rubber and plastic tubing, small pieces of ceramic pot, DDT powder etc.
2. Sort out small samples (5 g each) of waste from plant and animal sources. (for example vegetable matter, leaves, twigs, card board pieces, paper, cow-dung etc.).
3. Likewise sort out small samples (5 g each) of wastes materials from other than plant and animal source (for example, plastic caps, pieces of plastic tubes, polythene, glass nylon, metal can, ceramic pieces etc).
4. With the help of sharp knife cut all the samples into very small fragments and mix them thoroughly into separate heaps 'A' (of samples in step 2) and 'B' (of samples in step 3).
5. Mark the polythene bags 'A' and 'B' with water proof ink.
6. With the help of nail, pierce several small holes in each polythene bag. Fill the two samples 'A' and 'B' in their respective bags marked 'A' and 'B'. Tie their mouths firmly with nylon thread.
7. Using a spring balance, weigh each bag separately and note their initial masses.
8. Now bury the two sample bags in a shallow pit of appropriate size dug out in the corner of garden. Fill the pits with soil.
9. After three or four weeks, remove the bags from the pits, clean them thoroughly to remove any soil from the surface of the bags (Don't use water for cleaning.)
10. Keep the two bags in open sunlight to dry the bags.
11. Weigh the two bags again and find the difference between their initial and final masses.
12. Open the bags and transfer the contents separately on to two sheets of paper and observe the changes in the samples that

have occurred during the period of their burial in the pits. Record your observations in the following table.

	Initial mass	Final mass	Loss of mass
Sample A			
Sample B			

## OBSERVATIONS



At the end of the study determine:

- which sample observes substantial loss?
- Can various components in bags containing samples 'A' and 'B' be easily identified?
- Has the colour or texture of the components of samples 'A' and 'B' changed?

## DISCUSSION

Sample 'A' contained waste materials of plant and animal origin. When buried they were subjected to decomposition by soil micro-organisms. The complex organic matter was decomposed into simpler compounds some of which leaked out through the pores into the soil. Some material was partially decomposed (like twigs, bark, petioles and veins) while the soft tissues of leaves and dead animals were completely decomposed. It is because of this reason a substantial loss of weight has occurred in sample 'A'. The weight of sample 'B' remains unchanged because no component in the sample could be decomposed by the micro-organisms. It therefore follows that all the different types of material in Bag 'A' were bio-degradable while in Bag 'B' the samples were non bio-degradable.