Waist Deep in Waste - Necessity or Irresponsibility?

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Teacher Notes

Student Handout 1

In this experiment you will be comparing the properties of four different plastics. viz. carrier bags(from Pick and Pay), a piece of a detergent bottle, polystyrene and some black rubbish bags.

Plastic	Easily stretched or not	Is it rigid? (hard/firm)	Does it have a high melting point?	Does the plastic burn or char ?	Thermoplastic or thermosetting?*

Method :

1. Compare the plastics for ease of stretching and record your results in the table.
2. Compare the plastics for hardness, rigidity (firmness) and flexibility. Record your results.
3. Heat each piece of plastic in a small metal lid provided. This lid should be placed on a gauze mat, on a tripod and heated gently with a Bunsen burner. Observe changes that occur checking carefully to see whether the sample burns or chars (turns black and smokes). Charring means that the heat is causing the chemicals in the plastic to decompose (break down)

Some useful information :

Plastics which have low melting points

.	melt easily without decomposing
	stretch easily

are usually thermoplastic

Plastics which	have high melting points
	decompose before melting
	are usually rigid

are thermosetting

Student Handout 2

Design an experiment to determine the nature of the gases formed when some of the black plastic bag and some of the carrier bag is heated.

The following information will be useful to you.

Carbon dioxide bubbled through limewater turns the limewater milky.
Carbon dioxide is soluble in water
Sulphur dioxide bubbled through a solution of orange potassium dichromate turns dark green.
Red litmus paper turns blue in an alkaline solution
Blue litmus paper turns red in an acidic solution
Chlorine gas bubbled through a solution of potassium iodide and chloroform will turn purple.

Hand in a list of materials/ apparatus and chemicals that you may require.

In your group you will need to write up your experiment as follows :

1. Aim
2. Method (include apparatus and detailed instructions needed to carry out the method you will follow)
3. Results in a table.
4. Conclusions.

Student Handout 3

Roles to be played by student groups in Task 4.

In the role playing exercise there are 6 members in the group. One member of the group represents each of the roles given below. Write each character on a piece of paper and draw a role out of a box.

Refer to the 2 enclosed articles from Spectrum magazine to help you.
How best to handle plastics waste.

Unemployed Alexandra resident

As a member of your group, you are required to represent the unemployed citizens of Alexandra. Many rely on the dump for scrap materials and other recyclable goods. These are sold to support the rest of the family as the only source of income. If plastic items could be recycled, this would provide a welcome addition to the income that could be generated from the dump:

Can single component thermoplastics be identified ?

Can these thermoplastics be recycled if they contain a filler ?

Housewife from Edenvale

You are aware that the dump causes severe discomfort to your family and friends.
Better to get rid of the dump and incinerate the rubbish

When you present your arguments in the role playing exercise consider the following :

How does the dump affect the health of your family ?

Does the dump affect your immediate surroundings and the value of your property?

How do the dump trucks affect your life in terms of noise and road safety

Has the dump affected the crime rate in the area?

What concerns do you have about the safety of your children and pets?

The vermin (eg rats) that live on the dump

Consider the dangers of illegal dumping of medical and toxic waste at the site.

Representative from the Metropolitan substructure (municipality)

As an elected member of the Council, you have a responsibility to the community as well as keeping within an allocated annual budget.

Consider the following issues when presenting your case:

Is the recycling of thermoplastics viable ?

Are there viable options for alternative dump sites within your municipal area?

Are there extra expenses involved in relocating the site?

What expenses are involved in each option?

How would you go about rehabilitating the site if that was the option everyone supported?

Environmentalist

You live very close to the dump site. In the area there are primarily residential properties.

The local authority wants your advice. Consider the following:

How is the dump affecting your immediate environment?

What pollutants from the plastics waste are of concern to you?

What effect do these pollutants have on the air, ground water and surrounding soil?

Would any of the pollutants affect the health of the nearby residents?

Chemist

You have been commissioned by the municipality to analyse the plastic waste in the dump. Consider the following issues :

Hazardous and medical waste

Gas emissions and smell

Leachate emissions (polluted water that leaks out of dumps)

Chairperson of the group

Your role as Chairperson is to ensure that each role player has a an opportunity to put forward their arguments without interruption or interference from anyone else.

You need to keep order during the discussion.

You will be required to make notes and report back the findings of your group.

You need to facilitate a group consensus concerning this issue.

You need to remain completely objective and unbiased at all times.