

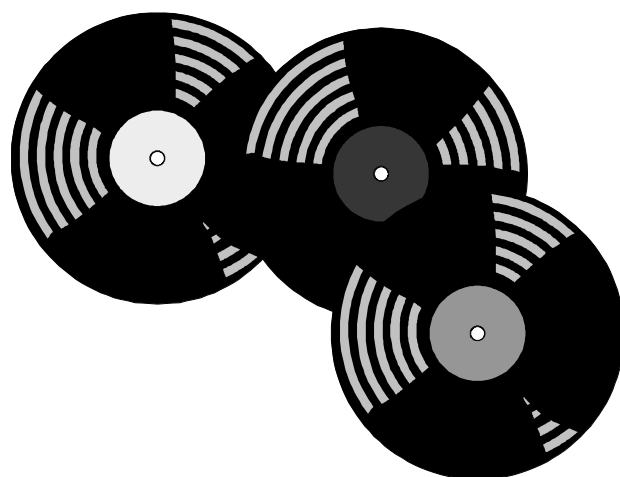


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Intermediate 1  
**Int 1**  
Chemistry



# Section 8

# Plastics

LO	Lesson	Text Book	Learning Outcomes Section 8: Plastics	Int1 Only
1	8.2	p127	Plastics are synthetic materials, i.e. made by the chemical industry.	
2	8.5	p127	Most plastics are made from oil.	
3	8.2	p127- p129	Examples of plastics include polythene, polystyrene, perspex, PVC, nylon, Kevlar, bakelite, formica and silicones.	
4	8.2	p127- p129	The everyday uses of plastics are related to their properties	
5	8.3	p129- p130	For some uses, plastics have advantages over natural materials and vice versa.	
6	8.4	p130	Biodegradable materials are broken down by bacteria in the soil and rot away.	
7	8.4	p130	Most plastics are not biodegradable and their durability and lightness can cause environmental problems.	
8	8.4	p130	<b>Some degradable plastics have been developed by chemists to alleviate the problems of plastic waste.</b>	<b>Int1</b>
9	8.5	p130	Some plastics burn or smoulder to give off toxic fumes, including carbon monoxide.	
10	a) 8.5 b) 8.6 c) 8.4	p130	Options for disposal of plastics include: a) incineration b) recycling c) burying.	
11	8.5	p130	With incineration the heat generated can be used as a source of energy but there are problems with emissions.	
12	8.6	p130	Since oil is a finite resource, recycling is to be encouraged and chemists are looking for renewable sources of plastics.	
13	8.6	p130	Recycling can be difficult because of the many different kinds of plastic in common use.	
14	8.7	p132- p133	Plastics can be either thermoplastic or thermosetting.	
15	8.7	p132	A thermoplastic is one which can be reshaped on heating.	
16	8.7	p132	A thermosetting plastic cannot be reshaped by heating.	
17	8.7	p133	The uses of thermosetting plastics are related to their heat and electrical insulation properties.	
18	8.8	p134	<b>Plastics are made up of polymers.</b>	<b>Int1</b>
19	8.8	p134	<b>Polymer molecules are made from many small molecules called monomers.</b>	<b>Int1</b>
20	8.8	p134	<b>The process of making a polymer by joining many monomers together is called polymerisation.</b>	<b>Int1</b>
21	8.8	p134	<b>The ethene monomers form poly(ethene), also called polythene; the styrene monomers form polystyrene.</b>	<b>Int1</b>

a) **Copy** the following passage into your jotter.

We use plastics for millions of purposes in our world, yet they are a relatively recently discovered material.

b) **Watch** the demonstration of burning plastics.

- Do plastics burn? (they are made from oil!)

c) **Answer** the following questions in your jotter.

1. Electrical wires are coated in plastic. Which property of plastic makes it a good choice for coating electrical wires?
2. Polythene shopping bags can be used again and again (well they should be anyway!) Which property of the plastic polythene make it a good choice for use as shopping bags?
3. Plastic has replaced paper as the material used in shopping bags. Which property of plastic, considering the Scottish weather, makes it a more reliable choice for use as shopping bags?
4. The handles of a cooking pot and cooking utensils are often made of plastics. Which property of plastics make it a good choice for this use?
5. Why is perspex a good choice as a replacement for glass?

a) **Copy** the following passage into your jotter.

There are many different synthetic plastics made by the chemical industry and each has its own use.

b) **Copy** the following table into your jotter.

Plastic	Use of Plastic
	Adaptable plastic used in 'poly' bags at the supermarket
	Used in protective packaging for electrical goods & for disposable drinks cup
	Transparent plastic used as a replacement for glass in windows and spectacles
	Used in window frames, drain pipes & guttering and other tough plastics
	Plastic fibre used in waterproof jackets and ropes
	Lightweight but very tough plastic used in bullet-proof jackets.
	Plastic used in electrical sockets and plug casings.
	Older plastic used for table surfaces as it is hard-wearing
	Plastic used as a sealant in baths, showers and waterproof coatings
3 Non-Plastics:	

c) Use the following word bank to **complete** your table.

- Use p127 - 129 of the text book to help you.
- The word bank contains 3 non-plastics. List them at the bottom of the table.

wordbank			
Formica	Nylon	Starch	Kevlar
Polythene	Perspex	PVC	Wood
Marble	Polystyrene	Silicone	Bakelite

a) **Copy** the following passage into your jotter.

Plastics are synthetic materials and are made by the chemical industry.

Plastics are used instead of the many natural materials in the world today. What are the advantages and disadvantages of using plastics instead of natural materials.

b) **Copy** and **complete** the following table in your jotter.

Example of use of plastic instead of natural material.	Advantage of using plastic over natural	Disadvantage of using plastic over natural material
1. Plastic Shopping Bags (instead of using paper shopping bags)		
2. Plastic bucket (instead of steel bucket)		
3. Plastic Spoon for Cooking (instead of using metal spoon)		
4. Plastic Spoon for Cooking (instead of using wooden spoon)		
5. Plastic drainpipe (instead of metal drainpipe)		
6. PVC Window Frames (instead of wooden frames)		

## 8.4

## Biodegradable &amp; Non-biodegradable

a) **Copy** the following passage into your jotter.

Plastic is a very common material which last for a very long time.

b) **Copy** the following passage into your jotter.

- Use the word bank to **complete** the statements.

wordbank		
bacteria	non-biodegradable	durability
burying	biodegradable	lightness

1. Plastics which do not break down are called .....
2. These plastics are not broken down by ..... in the soil.
3. Plastics can be an environmental problem due to their ..... and .....
4. Scientists have developed a ..... plastic called *biopol*, which will breakdown over a reasonable time.  
e.g. shopping bags from the Co-op.
5. .... plastics is a common disposal method but non-biodegradable plastics will remain in the ground for a very long time.

a) **Copy** the following passage into your jotter.

Plastics are non-biodegradable and getting rid of waste plastics is a problem.

b) **Copy** and complete the following passage.

- Use the word bank to **complete** the sentences.

<small>wordbank</small>	body	heat	hydrogen chloride
carbon monoxide	burn	incineration	dangerous

1. Most plastics are made from crude oil so most plastics will .....
2. Burning plastics gives of ..... energy, which could be used to save energy.
3. Burning plastics can give off ..... gases:
  - Most plastic release poisonous ..... gas when burned.
  - Burning PVC (polyvinylchloride) releases ..... gas, which can be toxic if breathed in.
  - Burning foam from inside old sofa chairs (polyurethane foam) releases hydrogen cyanide gas into the atmosphere. Cyanide is a poison in our .....
4. Burning is sometimes called .....

## 8.6








## Disposal of Plastics II: Recycling

a) **Copy** the following passage into your jotter.

Burning plastics is problematic so recycling is a better option - but it's not the easiest option! Recycling is difficult due to the need to separate out all the different types of plastic.

- Plastics are usually made from hydrocarbon crude oil products.
- Crude oil is a finite, non-renewable resource.
- Scientists are trying to develop plastics which can be made from renewable resources to help the environment.

b) **Read** the following table showing all the different types of plastics which have to be sorted out before recycling can take place.

Symbol	Plastic	
	PETE or PET	Polythylene terephthalate
	HDPE	High Density Poly(ethene)
	PVC	Polyvinylchloride
	LDPE	Low density poly(ethene)
	PP	Poly(propene)
	PS	Poly(styrene)
	-	All other plastics



a) **Copy** the following passage into your jotter.

Although there are many different plastics, plastics can be listed in two main groups:

1. Thermoplastic

- A plastic which will reshape on heating  
e.g. poly(ethene), poly(propene) and PVC

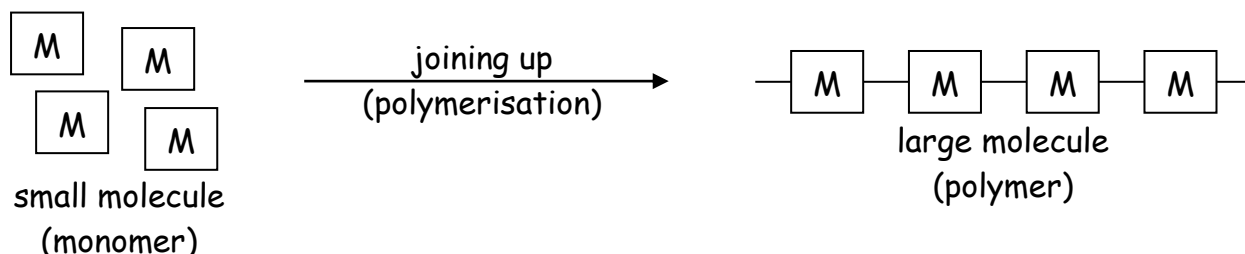
2. Thermosetting

- A plastic which cannot be reshaped on heating  
e.g. bakelite (used in electrical plugs and sockets)
  - Electrical insulator
  - Does not melt when heated (e.g. during an electrical fire)

b) **Watch** the demonstration of heating thermoplastic and thermosetting plastics.

a) **Copy** the following passage into your jotter.

Plastics are made from very small molecules which join together to make a much larger molecule:



b) **Copy and complete** the following table using the word bank.

wordbank		
polymerisation	polymer	monomer

Name	Meaning
	The original small molecule which joins together to make the plastic.
	The large molecule formed by millions of small molecules joining up.
	The name of the process where the large molecule is formed from the small molecules joining together.

c) **Copy and complete** the following table.

Name of Monomer	Name of Polymer
Ethene	Poly(ethene)
Styrene	.....
.....	Poly(propene)
Chloroethene	.....
.....	Poly(tetrafluoroethene)

## Access 3 Level Revision Questions

1. Which substance is a plastic:

**bakelite or wood**

2. Plastics are synthetic materials which:

**are made by the chemical industry or grow on trees**

3. Plastics are mainly made from:

**sugar cane or crude oil**

4. Thermosetting plastics are electrical insulators because they:

**are made of plastic or are thermosetting**

5. Plastics are:

**biodegradable or non-biodegradable**

6. Non-biodegradable means the plastic will

**break down in the environment or not break down in the environment**

7. A toxic gas which can be produced by burning plastics is:

**carbon dioxide or carbon monoxide**

8. A plastic which reshapes when heated is called:

**thermoplastic or thermosetting**

# Intermediate 1 Level Revision Questions

1. Which substance is a plastic:

- A. formica                      B. cement                      C. steel                      D. wool

2. Which substance is not a plastic:

- A. kevlar                      B. silicone                      C. bronze                      D. bakelite

3. Which poisonous gas is not released by burning plastics:

- A. carbon monoxide      B. sulphur dioxide      C. hydrogen chloride      D. hydrogen cyanide

4. The name of the process where propene is converted into poly(propene)

- A. cracking                      B. distillation                      C. polymerisation                      D. combustion

5. The polymer produced by joining styrene monomer units together is:

- A. poly(ethene)                      B. poly(styrene)                      C. poly(chloroethene)                      D. poly(tetrafluroethene)

6. The monomer from which the polymer poly(vinylchloride) is made is called:

- A. styrene                      B. ethene                      C. propene                      D. vinylchoride

7. Give a disadvantage of disposing of plastics by burying them in the ground.

8. Give an advantage of having plastic garden chairs rather than wooden chairs.

9. What is meant by the term "*thermosetting*."