

**GENERAL CERTIFICATE OF SECONDARY EDUCATION  
TWENTY FIRST CENTURY SCIENCE  
CHEMISTRY A**

**A323/02/INS**

Unit 3: Ideas in Context plus C7 (Higher Tier)

**INSERT**

**Friday 28 May 2010  
Morning**

**Duration: 60 minutes**



**MODIFIED LANGUAGE**

**INSTRUCTIONS TO EXAMS OFFICER/INVIGILATOR**

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- This insert contains the article required to answer question 1.

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- This document consists of 4 pages. Any blank pages are indicated.

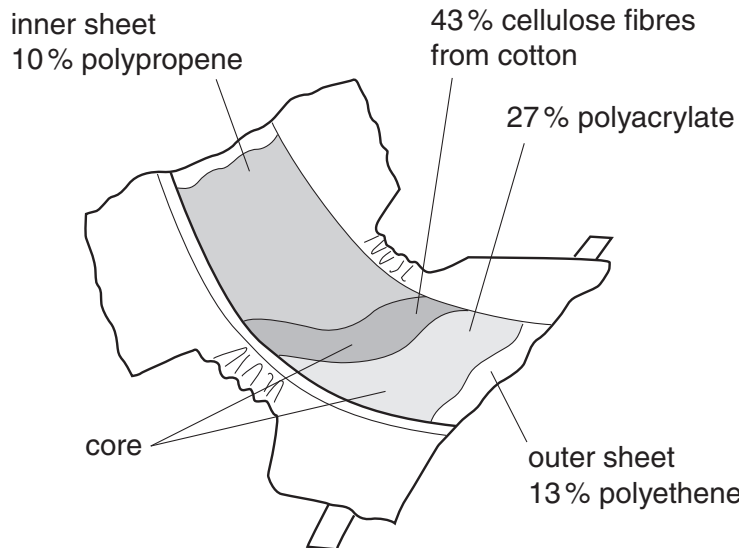
## Which nappy is best for the environment?

Babies wear nappies to keep themselves and their surroundings clean. Parents now have a choice between different types of nappy, but this choice might affect the environment.

### Disposable nappies

Disposable nappies are used only once. They are thrown away into dustbins when they have been soiled. Most disposable nappies used in the UK contain a core. This core consists of a fluffy pulp of cellulose fibres from cotton together with a layer of superabsorbent polymer (SAP). This is made from sodium polyacrylate. The core absorbs and retains urine. A polypropylene inner sheet protects the baby's skin from wetness. An outer sheet of polyethene prevents waste materials leaking from the core.

Polymers can be made with different properties. The properties of the polymers used are very important for the nappy to be effective.



UK households produce about 25 million tons of waste material each year. About 18% of this is recycled. Most of the remainder goes into landfill sites. Disposable nappies make up about 2% of the household waste going to landfill. This is about 400 000 tons each year.

### Reusable nappies

An alternative is to use reusable nappies. They are also known as 'terry' nappies. These are made from a square of cotton cloth that is folded to fit the baby. When soiled they are laundered in a washing machine and used again many times. The faeces from these nappies are usually disposed of in the sewerage system before the nappy is washed. To make this job easier, most parents use a disposable nappy liner to contain the faeces. This is usually made from a thin layer of polypropene.

### Life Cycle Assessment

Both disposable and reusable nappies create environmental impacts. These can be assessed in a Life Cycle Assessment, which follows the lifetime of each product 'from cradle to grave'. Each Life Cycle Assessment takes into account the sustainability of making the materials for the nappies. It also includes the environmental impact of making the products from these materials, using the products and disposing of the products. The requirements for energy input at each stage of manufacture also have an effect on the environment.

### Environmental impact

Many people take it for granted that reusable nappies must have less environmental impact than disposable nappies. But most parents choose to use disposable nappies. They account for over 95% of the market.

Reusable nappies reduce the demands on landfill, but they impact on the environment in other ways. For example, water and energy are used in washing and drying them. Terry nappies are made entirely from cotton, but this is the crop that is treated with the most fertiliser and pesticides in the world. Also, the majority of cotton is bleached, using chemicals that are potentially harmful to the environment.

### **Comparing the main environmental impacts**

Scientists working for a manufacturer of nappies compared Life Cycle Assessments on their leading brand of disposable nappy and on reusable 'terry' nappies. The impacts were found to be similar. However, the stages of the Life Cycle Assessment that are the main source of these impacts were found to be different for each type of nappy.

For disposable nappies the main sources of environmental impact are raw material production and use of these materials to manufacture the components of the nappies.

For reusable nappies the main sources of environmental impact are the generation of electricity used in washing and drying the nappies and the manufacture of the detergent used in washing.

### **Recycling**

A company has developed a process for the recycling of disposable nappies. In a UK factory planned by the company, nappies will be washed and then separated into plastics, pulp and sludge. Once separated, pulp and sludge can be used as a biomass fuel. Products such as house cladding and roof tiles can be made by melting and re-moulding the recycled plastics. If this process becomes widely used it will change the outcome of the Life Cycle Assessment for disposable nappies. It may make them more environmentally friendly than reusable nappies.

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