Period products: information sheets

Education in Chemistry
March 2021
https://rsc.li/3sYKC8T

A life-cycle assessment (LCA) looks at every stage of a product's life and assesses the impact it has on the environment.

Use the information included on the following sheets to complete the life-cycle assessment on the student worksheet (available as a separate download).

Challenge: Ask learners to consider why the information in the sheets is followed by superscript numbers (references). What is a reference? How can references help us to separate fact from opinion? Why is it important that the date is included in references?

Tampons

Life-cycle information

Don't forget – transportation occurs at all stages in the life cycle, from transporting raw materials to the finished product. These products will be transported long distances by lorry, rail or ship. All use diesel fuel.

Obtaining and processing raw materials	Tampons are made of several parts including an absorbent core with threads, a cord that the core is attached to and most come with an applicator. Plastics used in tampons include polyethylene (PE), polypropylene (PP) and polyester. Paper (from trees) and rayon (wood pulp from trees and/or cotton) are also used.[1] The plastics (PE, PP and polyester) used are made from non-renewable fossil fuels. The fossil fuels undergo processing to make the plastics including fractional distillation and then polymerisation. Both processes require energy from power stations. Power stations may use fossil fuels so produce carbon dioxide and other pollutants.
Manufacturing and packaging	Plastics used may undergo more processing so that they have the desired properties and have chemicals added to them to increase their longevity.[2] The wrapper the tampon comes in is usually plastic (PP or PE). The box packaging is usually made from cardboard. Electricity and thermal energy are needed to manufacture tampons. The electricity may be supplied by power stations that use fossil fuels or renewables sources of electricity.
Using the product	Tampons are single use. Tampons should not be flushed down the toilet. It is estimated that one person may use 240 tampons each year.[3] The average person who menstruates can do so for about 40 years in their lifetime.[4] No energy is used and no pollutants are produced during use.
Disposal of the product	Tampons should be put in bins. The plastic components, including the applicator, are considered as medical waste so are not recycled. The paper waste, plastic and rayon all end up in landfill. If flushed, tampons can end up in waterways. Plastics in tampons take about 500 years to break down.[5] If tampons are burned as part of waste management, they will release carbon dioxide and other chemicals.

Sanitary pads

Life-cycle information

Don't forget – transportation occurs at all stages in the life cycle, from transporting raw materials to the finished product. These products will be transported long distances by lorry, rail or ship. All use diesel fuel.

Obtaining and processing raw materials	Sanitary pads are made of several parts including a top and back sheet, absorbent core, wings and adhesives. Plastics including polyethylene (PE), polypropylene (PP) and polyester are used to make the top and back sheets. The wings can be made of paper (trees). The core usually contains a gel and an absorbent material like rayon (wood pulp from cotton and/or trees) or even polyester (plastic).[6] The plastics (PE, PP and polyester) used are made from non-renewable fossil fuels. The fossil fuels undergo processing to make the plastics including fractional distillation and then polymerisation. Both processes require energy from power stations. Power stations may use fossil fuels so produce carbon dioxide and other pollutants.
Manufacturing and packaging	Plastics used may undergo more processing so that they have the desired properties and have chemicals added to them in increase their longevity.[2] The pad comes in a plastic wrapper (PP or PE). The packaging is usually made from cardboard or plastic. Electricity and thermal energy are needed to manufacture pads. The electricity may be supplied by power stations that use fossil fuels or renewable sources of electricity.
Using the product	Pads are single use. It is estimated that one person may use 240 pads each year.[3] The average person who menstruates can do so for about 40 years in their lifetime.[4] No energy is used and no pollutants are produced during use.
Disposal of the product	Pads are normally disposed of in bins, so all components end up in landfill. However, in some countries they are disposed of in natural waterways like rivers.[7] Some plastics in pads can take about 800 years to break down.[8] If pads are burned as part of waste management, they will release carbon dioxide and other chemicals.

Menstrual cups

Life-cycle information

Don't forget – transportation occurs at all stages in the life cycle, from transporting raw materials to the finished product. These products will be transported long distances by lorry, rail or ship. All use diesel fuel.

Obtaining and processing raw materials	Menstrual cups are reusable products. Most are made of one component, medical grade silicone. Silicone is a synthetic polymer,[9] an elastomer, so is flexible. The polymer is made from naturally occurring silicon dioxide which is processed to produce silicon. Silicon is then processed further to make silicone. The processing requires energy eg thermal energy.[10]
Manufacturing and packaging	Menstrual cups may be packaged in cardboard and/or include a cotton (or other textile) bag to store the cup in. Electricity and thermal energy are needed to manufacture the cup. The electricity may be supplied by power stations or is supplied by renewable resources.
Using the product	Menstrual cups are reusable products. If maintained, some cups can last up to 10 years,[5] but this can vary. The average person who menstruates can do so for about 40 years in their lifetime.[3] The cups must be cleaned every 12 hours during a period. Tap water and soap can be used. The soap should be fragrance free and have a neutral pH. Some companies recommend the use of specialist cleaners that come in plastic bottles.[11] Some companies also recommend specialist wipes that have a limited use. The cup must be boiled at least once each month before use.[11] It can also be boiled after each monthly use. This requires energy and water.
Disposal of the product	Menstrual cups are made of silicone so can be recycled. Access to these facilities is limited.[12,13] If put in a bin, they end up in landfill. The length of time for the breakdown of silicone depends on the condition it is in. It doesn't break down into smaller pieces the way that plastics do. It can be chopped up, burned or repurposed.[14] When silicone breaks down it doesn't release hazardous chemicals into the environment.[12]

References

1. *Tampax*, 2021, https://tampax.co.uk/en-gb/tampax-articles/women-s-health/what-are-tampax-tampons-made-of?gclid=EAIaIQobChMIs62Vp5nO7gIVdIBQBh2CxAv5EAAYASAAEgL3VPD_BwE (Accessed February 2021), **© 2021 Procter & Gamble.**
2. A. Chamas *et al, ACS Sustainable Chem. Eng.*, 2020, 8, 3494–3511. https://doi.org/10.1021/acssuschemeng.9b06635
3. A. Hait and S. Powers, *Data in Brief*, 2020, **28**, 104851. https://doi.org/10.1016/j.dib.2019.104851
4. A. Borunda, 2019, *National Geographic*, https://www.nationalgeographic.com/environment/2019/09/how-tampons-pads-became-unsustainable-story-of-plastic/ (Accessed February 2021).
5. L. Winter, 2019, *Glamour*, https://www.glamourmagazine.co.uk/article/period-product-waste (Accessed February 2021).
6. *Always,* 2021, https://always.com/en-us/about-us/what-are-always-products-made-of (Accessed March 2021), **© 2021 Procter & Gamble.**
7. S. Garikipati, *ZME Science*, 2020, https://www.zmescience.com/science/women-sustainable-menstrual-products-crisis-pandemic/ (Accessed February 2021).
8. *Duquesne University*, https://onlinenursing.duq.edu/master-science-nursing/the-ultimate-guide-to-feminine-hygiene/ (Accessed February 2021).
9. J. Castro, 2013, https://www.livescience.com/37598-silicon-or-silicone-chips-implants.html (Accessed February 2021).
10. *How Products are Made,* http://www.madehow.com/Volume-6/Silicon.html (Accessed February 2021).
11. *Diva Cu*p, 2021, https://divacup.com/ (Accessed February 2021), **© 2021 Diva International Inc.**
12. *MCA Online*, 2019, https://www.menstrualcupsaustraliaonline.com.au/how-to-dispose-of-your-old-menstrual-cup/ (Accessed: February 2021).
13. *The Waste Management & Recycling Blog*, 2019, https://www.forgerecycling.co.uk/blog/a-guide-to-reusable-eco-friendlier-period-products/ (Accessed February 2021), © 2021 Forge Waste & Recycling.
14. *Pixie Cup*, 2020, https://www.pixiecup.com/blog/how-to-recycle-a-menstrual-cup/ (Accessed February 2021), **© 2020 Pixie Cup, LLC.**
    The Guardian, 2015, https://www.theguardian.com/sustainable-business/2015/apr/27/disposable-tampons-arent-sustainable-but-do-women-want-to-talk-about-it (Accessed February 2021).