



GREEN-EDU Learning Activity

Title: Plastic vs paper shopping bags

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Summary

Lesson plan summary

Students are provided with information and experimental data on plastic and paper bags so that they can get the conclusion on which one is the most environmentally friendly. Students work in groups and, acting as Ministry for the environment officials, form proposals based upon scientific reasoning, present them and answer questions asked.

Subject	Green Chemistry
Topic	Which bag is the most environmentally friendly: conventional plastic, paper bag or biodegradable paper bag
Age of students	High school students- 14-18
Preparation time	40 minutes
Teaching time	60 minutes
Online teaching material (links for online material)	<i>Introducing Green Chemistry: The Science of Solutions</i> https://blossoms.mit.edu/videos/lessons/introducing_green_chemistry_science_solutions
Offline teaching material	https://www.beyondbenign.org/bbdocs/pdfs/Lactic_Acid_Titration_Extension.pdf <ul style="list-style-type: none">▪ "12 Principles of Green Chemistry" from Figure 4.1: (p.30). 12 Principles of Green Chemistry from <i>Green Chemistry: Theory and Practice</i> (1998) by Anastas P and Warner J. By Permission of Oxford University Press.▪ American Chemical Society Green Chemistry Institute▪ EPA Green Chemistry▪ Beyond Benign▪ Plastics Bioplastics - American Chemical Society▪ https://greenchemistry.yale.edu/sites/default/files/files/Recycling%20P.LA.pdf



Aim of the lesson

By the end of this lesson students will learn about:

- 1) Plastic bags
- 2) Paper bags
- 3) Reusable-biodegradable plastic bags
- 4) Life cycle assessment
- 5) Paper recycling
- 6) Evaluation of data provided
- 7) Making a presentation based upon the above

Trends

Problem Based learning, Collaborative Learning

Activities

Name of activity	Procedure	Time
Introduction to Green Chemistry	<ol style="list-style-type: none"> 1. Start the lesson with introductory questions: What does a chemist do? What are some chemical products? What do you think about when you hear the words "Green Chemistry"? What is environmental science? 2. Students can watch the introductory video ... (MAKE VIDEO) 3. Students will be introduced to the 12 Principles of Green Chemistry and the 3 Rs Activity: Think about what Green Chemistry means to you. Present the 12 principles in your own words. Students will be divided in groups. Each group will be assigned with a green Chemistry principle and will be asked to present it with a skit, a drawing or even a song to their classmates. 	45X min
Main activity	<p>Students are provided with a lot of links on paper and plastic bags or comparisons between plastic and paper bags, collect the information and prepare a relevant presentation, acting as Ministry for the environment officials, based upon scientific facts. The presentation will be up to 600 words and could also be up to 15 slide powerpoint presentation.</p> <p>Links plastic bags vs paper bags</p> <ol style="list-style-type: none"> 1. https://extrabags.gr 	



2. www.allaboutbags.ca/papervplastic.html
3. <https://science.howstuffworks.com/environmental/green-science/paper-plastic1.htm>
4. <https://science.howstuffworks.com/plastic.htm>
5. <https://www.treehugger.com/culture/paper-bags-or-plastic-bags-everything-you-need-to-know.html>
6. <https://stanfordmag.org/contents/paper-plastic-or-reusable>
7. <https://www.nytimes.com/2019/03/29/climate/plastic-paper-shopping-bags.html>
8. <https://www.interplas.com/packaging-earth-friendly-recyclable-plastic-bags>
9. https://www.huffpost.com/entry/paper-plastic-reusable-tote-bag-environment_n_5cd4792ae4b0796a95d88b5f
10. <http://web.mit.edu/course/3/3.a30/www/refs/Institute%20for%20Life%20cycle%20Environmental%20Assessment.pdf>
11. <https://www.ecoenclose.com/Paper-versus-Plastic-and-Bio-Plastic/>
12. https://greenliving.lovetoknow.com/Biodegradable_Drinking_Straws
13. www.yalescientific.org/2015/05/paper-vs-plastic-the-science-behind-the-national-shopping-controversy/
14. <https://hellohomestead.com/are-reusable-bags-really-better-for-the-environment/>
15. <https://www.nrcm.org/wp-content/uploads/2016/05/Comparing-environmental-impact-of-plastic-vs.-paper.pdf>
16. <https://news.cityofsydney.nsw.gov.au/articles/in-the-bag-the-best-alternatives-to-single-use-plastic-bags>
17. http://cdn.itvs.org/plastic_bag_lesson_plan.pdf
18. <https://scholarworks.umass.edu/>
19. <http://techalive.mtu.edu/>
20. <https://xhmeiapeddia.blogspot.com/search/label/Environment>
21. <https://tinyurl.com/y3akf3xz>
22. <https://tinyurl.com/y4sn595r>
23. <https://tinyurl.com/y2y3mubw>
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28. <https://tinyurl.com/yae6glh3>