

Products, Organisms, and Our Environment

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for

Teacher Name:

Class Period:

Date:



- List 10 plastic items or products that you use on a daily basis, at school, home, etc..
- List 5 chemicals that you use regularly.
- How do you think the items and chemicals listed above could affect the environment? Have you ever considered this question before, why or why not?



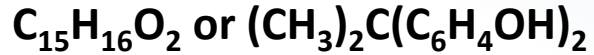
 bpa free

(<http://store.nalgene.com/product-p/682009-161.htm>)

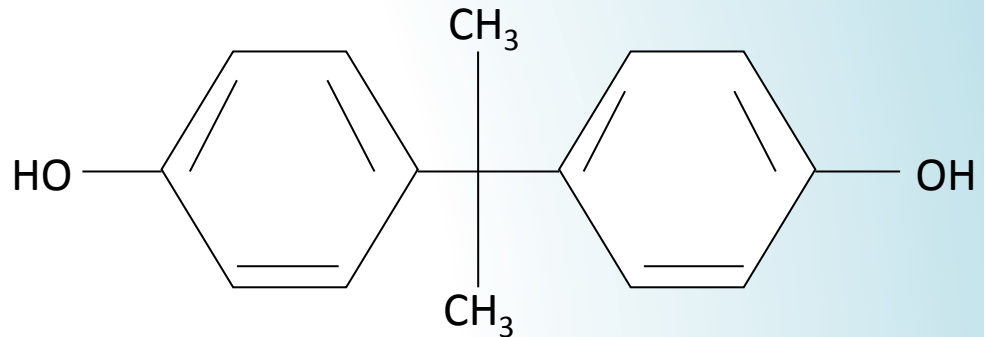


<http://www.greenzer.com/blog/tag/bisphenol-a>

WHAT IS BPA?



- ❖ Bisphenol A (BPA) is an industrial chemical used in many products since the 1960s.
- ❖ It is used to make a hard, clear plastic known as polycarbonate.



Approximately 95% of all BPA is used as an intermediate in the production of polycarbonate plastic and epoxy resins.

Major End Use Applications for

Polycarbonate:

- glazing and sheeting (eg. a polished surface)
- electrical and electronic goods
- household equipment
 - Bottles
 - Utensils
 - Containers

Epoxy Resins Are Used As:

- protective coatings for architectural structures
- marine and car coatings
- container coatings

Why BPA?

Polycarbonate plastic qualities:

- Lightweight
- Extremely durable
- Glass like clarity
- High heat resistance
- Stain resistance
- Odor resistance
- Electrical resistance

So what is the problem?

Plasticizers are not especially stable in these raw products; could leach out and thus end up in the environment

BPA is present in many locations, including the aquatic environment, and enters water systems through point discharges such as landfill leachates and sewage treatment plant effluents.



Since the aquatic environment could receive discharges of BPA, a good deal of research on toxicity to wildlife has focused on aquatic organisms. ⁽²⁾

For example:

Some studies have indicated that BPA has been shown to affect reproduction, impair development in crustaceans and amphibians and to induce genetic aberration. ⁽³⁾

Some fish are also known to be affected, but at higher concentrations. ⁽³⁾



How is it happening?

Various chemicals are discharged into the environment and can mimic or antagonize the action of hormones in organisms. ⁽⁶⁾

These chemicals act as an **Endocrine Disrupter (ED)**-an exogenous substance or mixture that alters function(s) of the endocrine system and consequently causes adverse effects in an intact organism, or its progeny, or subpopulations. ⁽⁴⁾

The aquatic environment has been termed “**the ultimate sink**” for natural and man-made chemicals, and endocrine disruptors have been found in freshwater, estuarine, and marine environments, raising the possibility that endocrine disrupting chemicals (EDCs) impact organisms living in these aquatic environments. ⁽⁴⁾

EDCs that are suitable to cause endocrine modulation in vivo have one of three characteristics:

- 1) They are present in the environment at high concentration
- 2) They are persistent and bioaccumulative
- 3) They are constantly entering the environment

BPA does not bioaccumulate, but is constantly entering the aquatic environment

In the aquatic environment, EDCs are easily bioavailable to fish through a variety of routes

- Aquatic respiration
- Osmoregulation
- Maternal transfer of contaminants in lipid reserves of eggs
- Dermal contact with contaminated sediments
- Ingestion of contaminated food

Think about the consequences...

- ❖ How would it affect certain fish populations?
- ❖ How could it affect the economy?
- ❖ What are some other problems that may occur?

For the future...

There are shortfalls in the knowledge of the relative importance of endocrine disruption in different wildlife taxa, and the level of the problem of endocrine disruption in wildlife relative to other environmental stressors. (6)

The challenge is to develop a greater understanding of how EDC's disrupt physiological function and to develop a regulatory test for EDCs that are broadly applicable to a variety of wildlife species. (6)

Toxicologists, ecologists, and endocrinologists must identify estuarine and marine populations at risk for endocrine disruption, analyze hormonal function in those population, and suggest changes in domestic and industrial land and water use that will maintain healthy marine animal populations. (5)

Ideas to consider...

“Considering the increasing migration of people to coastal areas, sewage effluents could be of concern for estuarine and marine species as well as freshwater ones.” ⁽⁵⁾

Coastal Growth

Over 153 million Americans live in coastal counties in 2003 (over 53% of the population.)

Coastal counties are growing nearly three times as fast as non-coastal counties



Ideas to consider...

- With the increase in people moving towards the coast, will there be an increase in EDCs reaching the aquatic environments?
- Are the concentrations measured in the water similar to those measured in labs?
- Do different concentrations affect certain organisms differently?
- What are possible solutions to this problem?