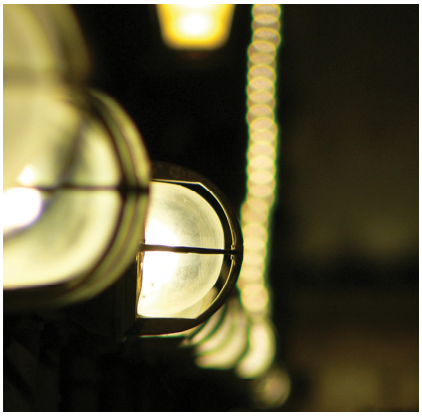
University of Saskatchewan

Smart Purchases Big Impact

Sustainable Purchasing Guide

Sorbents

Sustainability... your university, your world



University of Saskatchewan

Sorbents

Introduction

This section provides information on currently available ***sorbents*** that can help to move the University of Saskatchewan toward its sustainability goals. Living within the boundaries of our sustainability goals requires us to apply two main strategies:

Dematerialization requires that we reduce the amount of materials as much as possible; and that we continually move toward the use of 100% recycled content.

Substitution requires that we find less harmful materials to replace those that currently damage and are not recyclable.

Sustainable purchasing is about including social, environmental, financial and performance factors in a systematic way. It involves thinking about the reasons for using the product (the service) and assessing how these services could be best met. If a product is needed, sustainable purchasing involves considering how products are made, what they are made of, where they come from and how they will be used and disposed.

Finally, remember that this is an evolving document – it will change with new information as our understanding of sustainability impacts and potential solutions improves.

Purchasing Services

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Smart Purchases Big Impact

Wherever possible **CHOOSE** products that employ a combination of characteristics listed in the left hand column, and **AVOID** products that demonstrate characteristic in the right-hand column.

CHOOSE	AVOID
• Recycled sorbents • The correct sorbent for the spill/conditions • Biocompatible sorbents	• Reusable sorbents

Option: Choose the Correct Sorbent for the Spill

Strategy: Substitution (SO 1, 2, 3, 4)

When dealing with spills that are potentially harmful to the environment and human health, it is important to specify the correct sorbent for the specific spill. Choosing the wrong product can cause secondary contamination of the soil or water supply. For example, sorbents designed especially for oil spills will isolate and soak up the oil or hydrocarbons. These sorbents are comprised of layers of porous fabrics. In contrast, absorbents for water-based liquids are designed with a liquid permeable material surrounding a non-reactive particulate. Using the wrong sorbent will make it ineffective and can lead to environmental and health consequences.

Option: Choose the Correct Sorbent for the Conditions

Strategy: Substitution (SO 1, 2, 3, 4)

The conditions surrounding the spill also influence the choice of sorbent. For example, if a spill occurs at a very low temperature many organic sorbents continue to work well. In contrast, the performance of synthetics drops off significantly at very low temperatures.

If there are flammable substances in the area, avoid synthetic sorbents. Polypropylene can catch fire easily and can also combust violently with some by-products.

For waterborne spills, synthetic sorbents are preferable. Organic sorbents will break down (since most are biodegradeable). In order to absorb the spill, the substance must sit for a long period of time without sinking or breaking down. In addition, organic sorbents will continue to pollute the environment if the substance degrades in water.

Option: Choose Sorbents with Recycled Content

Strategy: Dematerialize and Substitution (SO 1, 2, 3, 4)

Sorbents can be manufactured using recovered paper, textiles, plastics, wood and other sources of cellulose.

The sorbents themselves can be recycled after being used. These can be sent back to the manufacturer to be cleaned and re-used in the fabrication of more sorbent. This process effectively diverts waste from landfills.

Recyclable sorbents are not the same as sorbents that claim to be reusable. Polypropylene sorbent suppliers have claimed the product is reusable but they often have poor retention characteristics as a result. If the sorbent binds the spill loosely enough that it can be easily removed then there is a high chance of secondary contamination. Any reusable product will require proper hazardous waste removal to restore the sorbent to its original function without diminished quality.

Option: Choose Biologically-Compatible, Renewable Materials

Strategy: Substitution (SO 1, 2, 3, 4)

Many available sorbents are made from natural, renewable fibres. Natural sorbents are often made from the agricultural waste of corn, coconut, wood fibres, etc.

Not all organics are made of renewable materials and this should be kept in mind when choosing sorbents. For instance, Diatomaceous earth (DE) is an organic compound composed of diatom fossil deposits. DE is relatively inert and has low impacts for humans and animals. Even so, it is non-renewable resource which must be mined and cannot be replenished efficiently.

Arriving
at the currently preferred options

1. Identify the service

Sorbents are primarily used in spill kits to clean up spilled liquids.

2. Assess the need

The University of Saskatchewan has a number of laboratories, as well as areas for vehicle maintenance and machinery repair. These areas use a variety of potentially hazardous materials that may require control by sorbents if spilled.

3. Identify the contents

Synthetic sorbents are generally made of polypropylene, a petroleum based plastic.

Organic sorbents can be made from biocompatible resources such as maize or recycled paper products. Sorbents can also be made of diatomaceous earth (DE), an organic compound composed of diatom fossil deposits. Diatoms are eukaryote algae that can be up to 20 million years old. Although DE is relatively inert with low impacts for humans and animals, it is a non-renewable, mined resource.

4. Identify sustainability impacts

i....systematically increasing concentrations of substances from the earth's crust?

- Producing polypropylene requires large amounts of ***energy***, contributing to increasing concentrations of carbon dioxide (CO2) and sulfur oxides (SOx) in the air. This results in negative impacts such as ***climate change*** and ***acid rain***.

ii. ...systematically increasing concentrations of substances produced by society?

- Sorbents are used to control the ***contamination*** of materials that may physically degrade natural systems. If an incorrect sorbent is used or it is improperly used, secondary contaminations may result.
- ***Polypropylene*** does not biodegrade and therefore systematically increases on the earth's surface. As well if incinerated, polypropylene emits harmful chemicals into the atmosphere.

iii. ...systematically degrading nature by physical means?

- Diatomaceous earth is mined almost exclusively through ***open-pit mining*** operations. This means that instead of digging a network of tunnels to access the deposits of diatomaceous earth, the earth is moved aside to expose the layers of earth underneath. The overburden, or covering layers of earth, is stripped aside by machinery, and the earth is harvested, loaded into trucks, and carried away. In general, open-pit or strip mining is very destructive to natural systems if proper precautions are not taken to reduce the mine's physical footprint and if the impacted lands are not reclaimed.

iv. . . .systematically undermining people's ability to meet their basic human needs?

- While a precise link has not been established, there are higher instances of lung-related ***illness*** among diatomaceous earth miners than the norm.
- The incineration of polypropylene results in the emission of volatile organic compounds (VOCs) that can be hazardous to the environment and ***human health***. For example, toluene (methyl benzene) can negatively affect the nervous system, kidneys, liver and heart. Formaldehyde, a suspected carcinogen and can irritate the eyes, nose and throat during short exposures.

continued on page 3 . . .

5. Envision sustainable sorbents

In a sustainable future, sorbents would not be necessary because there would be no biohazardous materials to cause harm to nature if spilled.

Until that is achieved, sustainable sorbents would be either made from sustainably harvested renewable resource or from mined materials that can be re-used in technical cycles. Sorbents would also be recyclable.

The use of the raw material and the production and use of the sorbent would not result in systematic increases of substances from the earth's crust or produced by society. This means that the ***energy*** used to power the various processes would be generated entirely from sustainable and renewable sources in a carbon-neutral manner. Heavy metals and chemicals would either not be used or would be 100% recycled in technical cycles so that they do not accumulate in nature. The ***production and use*** of the sorbent would not physically degrade nature and would prevent physical degradation of the natural world from spills, and in no way undermine people's capacity to meet their needs.

6. Identify and prioritize alternatives

To identify the best options, review the Current Options on page one and choose the most appropriate alternative by using the following three criteria for assessment:

a) Does the product or service move us in the right direction with regards to our four Sustainability Objectives?

b) Does the product or service create a flexible platform for the next step toward sustainability?

c) Is the decision financially viable?

Resources
and Additional Information

1. Environmental Protection Agency: Sorbents
www.epa.gov/emergencies/content/learning/sorbents.htm

WHISTLER

This guide was made possible through the generosity of the Whistler 2012 project, which shared its template and much of its research.