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Survey of Bisphenol A in Soft Drink and Beer Products from Canadian Markets

Bureau of Chemical Safety
Food Directorate
Health Products and Food Branch

A WHO Collaborating Centre for
Food Contamination Monitoring



World Health
Organization

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Canada 

Health Canada is the federal department responsible for helping the people of Canada maintain and improve their health. We assess the safety of drugs and many consumer products, help improve the safety of food, and provide information to Canadians to help them make healthy decisions. We provide health services to First Nations people and to Inuit communities. We work with the provinces to ensure our health care system serves the needs of Canadians.

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Background

Bisphenol A (BPA) is the common name for 2,2-(4,4'-dihydroxydiphenyl)propane, 4,4'-isopropylidenediphenol, or 2,2'-bis(4-hydroxyphenyl)propane. It is used as an intermediate in the production of epoxy resins which are used in the internal coating for food and beverage cans to protect the food from direct contact with metal. BPA can migrate from cans with epoxy coating into foods, especially at elevated temperatures (for example, for hot-fill or heat-processed canned foods). BPA is one of the 23000 chemical substances on the CEPA (Canadian Environmental Protection Act) Domestic Substance List (DSL) identified for further evaluation under government of Canada's Chemical Management Plan (CMP).

BPA was included in [Batch 2 of the Challenge](#) under CMP carried out by Health Canada and Environment Canada. On October 18, 2008, the Government of Canada released its final assessment report, including the Government's proposed risk management approaches to reduce Canadian exposure to BPA. Health Canada has committed to a research and monitoring agenda to further investigate potential human health effects of BPA and improve its understanding of Canadian exposure to this chemical through food sources. The purpose of this survey was to gather occurrence levels of BPA in canned soft drink and beer products available for sale in Canada to contribute in updating the BPA exposure estimate for Canadians.

Sampling Plan and Analytical Methodology

This survey examined samples from 38 soft drink and beer products marketed under a variety of brands. The products were purchased in April 2009 in Ottawa. These products included 22 soft drink samples (from a local grocery store) and 16 beer samples (from a local liquor store). The 22 soft drink samples included 8 products (6 brands) in both cans and PET (polyethylene terephthalate) bottles, and 2 products (1 brand) in cans, PET and glass bottles. The 16 beer samples included 8 products (8 brands) in both cans and glass bottles. All soft drink samples were stored at room temperature before analysis, while beer samples were stored at 4 °C.

Since BPA is not expected to be present in canned beer products at high levels based on Health Canada's [previously published canned soft drink results](#), an extensive survey was not deemed necessary. Therefore, only those beer products available in both cans and glass bottles were collected in order to analyze BPA levels and to investigate the sources of BPA in canned beer products.

Health Canada continually works to develop more sensitive methods with detection limits as low as possible for the determination of chemicals in foods in order to support more accurate human exposure assessments. For this survey, an analytical method based on gas chromatography/mass spectrometry (GC/MS), developed previously for the [determination of BPA in various food samples](#), was adapted and employed for the analysis of beverage samples for BPA. The method detection limit (MDL) and limit of

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quantification (LOQ) were 0.0045 and 0.015 µg/L*, respectively. For each product collected, two subsamples from each sample were analysed and the resulting average of the two analyses are shown in [Table 1](#).

Notes:

- ❑ All canned beverage samples were tested as purchased.
- ❑ It should be noted that the absence of any particular brand from this survey means only that the brand was not included in the survey. No particular inference should be drawn from the presence or absence of any brand.
- ❑ Samples represent a “snapshot” of the market at the time of sampling and do not represent market share. Product names and availability correspond to the time of sampling and may not represent current products on the market. Differences between brands do not necessarily reflect differences in consumer exposure to BPA.
- ❑ The results shown in [Table 1](#) are generated for research purposes and should not be considered as representative of the distribution of BPA in soft drink and beer products or to assist or guide product choices for consumers.
- ❑ For each of the 38 soft drink and beer samples, two subsamples from the same container were analysed and the average of the two analyses was reported.
- ❑ All soft drink samples were stored at room temperature before analysis, while beer samples were stored at 4 °C.
- ❑ All samples were analysed before their expiry dates.

BPA Levels in Canned Soft Drink and Beer Products

[Table 1](#) summarizes the levels of BPA determined in samples of canned soft drink and beer products. BPA was detected in 20 of 38 soft drink and beer products; the BPA level in 18 products was below the method detection limit of 0.0045 µg/L*.

BPA was not detected in any of the glass bottled soft drink samples, and was only detected in one soft drink sample packaged in PET at a level of 0.018 µg/L*. However, low levels of BPA were detected in all surveyed canned soft drink samples with levels ranging from 0.019 to 0.21 µg/L*.

Low levels of BPA were detected in all surveyed canned beer samples with levels ranging from 0.081 to 0.54 µg/L*, and only one bottled beer sample at a level of 0.054

* 1 µg/L is equivalent to 1 part per billion (ppb)

µg/L*. The presence of BPA in canned beer samples and its absence (or lower level than canned) in bottled beer samples suggests that migration from can coatings is a source of BPA in canned beer products.

The absence of BPA in surveyed plastic and glass bottled beverage products, and its presence in all of the corresponding surveyed canned beverage products, suggests that migration from can coatings is a source of BPA in canned beverage products.

Health Significance of the Survey Results

In March, 2008, Health Canada's Food Directorate completed a [Health Risk Assessment of BPA from food packaging applications](#)⁺ to determine exposure estimates to BPA. Health Canada's Food Directorate has concluded that:

- ❑ The current dietary exposure to BPA through food packaging is not expected to pose a health risk to the general population, including newborns and infants.

In view of uncertainties related to possible neurodevelopmental and behavioural effects that BPA may have in experimental animals, Health Canada's Food Directorate has recommended that precaution be exerted on products consumed by the sensitive subset of the population, i.e. infants and newborns, by applying the ALARA (as low as reasonably achievable) principle to reduce their exposure to BPA through food packaging applications.

Other international food regulatory agencies – notably in the United States, Europe, the United Kingdom and Australia-New Zealand – have reviewed the "[Health Risk Assessment of Bisphenol A from Food Packaging Applications](#)⁺", prepared by Health Canada's Food Directorate, and have confirmed that the conclusions reached are supported by the current scientific evidence as described in the document.

The results of this survey clearly indicate that exposure to BPA through the consumption of soft drink and beer products would be extremely low. The low levels of BPA found in these products confirm Health Canada's previous assessment conclusion that the current dietary exposure to BPA through food packaging uses is not expected to pose a health risk to the general population.

+ Health Risk Assessment of Bisphenol A from Food Packaging Applications. ISBN: 978-0-662-48686-2

* 1 µg/L is equivalent to 1 part per billion (ppb)

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Table 1: Concentrations ($\mu\text{g/L}$) of BPA in soft drink and beer products as consumed

- It should be noted that the absence of any particular brand from this survey means only that the brand was not included in the survey. No particular inference should be drawn from the presence or absence of any brand.
- Samples represent a “snapshot” of the market and do not represent market share. Product names and availability correspond to the time of sampling and may not represent current products on the market. Differences between brands do not necessarily reflect differences in consumer exposure to BPA.
- The results shown in the table are exploratory and should not be used to indicate the distribution of BPA in soft drink and beer products, or to assist or guide product choices for consumers.
- Results are displayed in [Table 1](#) as consumed.

Soft Drink Products				
Company Name	Product Name	Container Type	Container size (mL)	Concentration ($\mu\text{g/L}$)
Canada Dry Mott's Inc. / Dr. Pepper Snapple Group	Canada Dry Ginger Ale	Can	237	0.13
		PET	2000	< MDL
	Schweppes Ginger Ale	Can	237	0.024
		PET	2000	< MDL
	Dr. Pepper	Can	355	0.019
		PET	2000	< MDL
Coca-Cola Ltd	Coca-Cola	Can	237	0.11
		Glass	237	< MDL
		PET	2000	< MDL
	Diet Coke	Can	237	0.13
		Glass	237	< MDL
		PET	2000	< MDL
PepsiCo Canada ULC	Pepsi	Can	237	0.021
		PET	2000	< MDL
	Diet Pepsi	Can	237	0.037
		PET	2000	0.018
	7UP	Can	237	0.042
		PET	2000	< MDL
	Diet 7UP	Can	355	0.21
		PET	2000	< MDL
	Mountain Dew	Can	355	0.20
		PET	2000	< MDL

< MDL = Less than the Method Detection Limit
 1 $\mu\text{g/L}$ is equivalent to 1 part per billion (ppb)

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Beer Products				
Company Name	Product Name	Container Type	Container size (mL)	Concentration (ug/L)
Brauerei Beck GmbH & Co	Beck's Beer	Can	500	0.11
		Glass	330	< MDL
Heineken Brouwerijen B.V.	Heineken Lager Beer	Can	500	0.18
		Glass	330	< MDL
Keith's Brewery	Alexander Keith's	Can	473	0.33
		Glass	341	< MDL
Labatt Brewing Company	Budweiser	Can	473	0.14
		Glass	341	< MDL
	Labatt Blue	Can	473	0.19
		Glass	341	0.054
Molson Canada	Coors Light	Can	473	0.081
		Glass	341	< MDL
	Molson Canadian	Can	473	0.12
		Glass	341	< MDL
N.V. InBev Belgium S.A.	Stella Artois	Can	500	0.54
		Glass	330	< MDL

< MDL = Less than the Method Detection Limit
 1 µg/L is equivalent to 1 part per billion (ppb)