Health Canada Santé Canada

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Survey of Bisphenol A in Canned Drink Products

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

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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 drink products to contribute in updating the BPA exposure estimate for Canadians. The survey results were also published in the peer-reviewed scientific literature[1].

Sampling Plan and Analytical Methodology

In this survey, samples of 72 canned drink products were collected from local stores in Ottawa in April 2007. All of these products were carbonated except for 4 tea drink products. These samples covered a wide variety of products which included: diet, non-diet, fruit-flavoured, energy drinks, and others varieties. These products covered at least 84% market share of soft drink products sold in Canada.

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. The method used previously by Health Canada for determination of BPA in liquid infant formula products was adapted and validated for the determination of BPA in canned drinks. This method, with a detection limit of 0.045 µg/L[*], was used to determine levels of BPA in 72 canned drink products sold in Canada. For each canned drink product collected, two subsamples from each sample were analysed and the resulting average of the two analyses are shown in Table 1.

[1] Xu-Liang Cao, Jeannette Corriveau, and Svetlana Popovic. Levels of Bisphenol A in Canned Soft Drink Products in Canadian Markets, J. Agric. Food Chem., 2009, 57 (4), pp 1307-1311.

[*] 1 µg/L is equivalent to 0.000001 g/L or 1 part per billion (ppb)

Notes:

- Canned drink samples were tested 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 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 exploratory and should not be used to indicate the distribution of bisphenol A in canned drink products or as indices of good product choices for consumers.

BPA Levels in Canned Drink Products

Table 1[2] summarizes the levels of BPA determined in samples of the canned drink products. Due to the sensitivity of the method being used, detecting as low as 0.045 µg/L*, BPA was detected in samples of almost all drink products except for two tonic water soda products and one energy drink product (data not shown). It is believed that quinine hydrochloride, which is commonly used as a bittering agent in tonic type drinks, may interfere with BPA extraction.

Concentrations of BPA in most of the drink products were generally low; 75% of the products had BPA levels less than 0.5 µg/L*, 85% of the products had BPA levels less than 1 µg/L*, and the average BPA level in all products was 0.57 µg/L*. This explains why BPA had not frequently been detected in canned drink products, as previously reported in the scientific literature, due to the relatively high detection limits of employed methods (see reference section).

Variation of BPA levels in different canned drink products (0.032 to 4.5 µg/L*) could be due to the differences in can coatings (type, amount etc.) or can sterilization conditions (temperature and duration) used by different canned drink product companies. Accidental exposure of the canned drink products to heat (e.g. sunlight) during storage and transportation could also be a factor which potentially increases BPA migration to the beverage.

[2] Data previously published: Xu-Liang Cao, Jeannette Corriveau, and Svetlana Popovic. Levels of Bisphenol A in Canned Soft Drink Products in Canadian Markets, J. Agric. Food Chem., 2009, 57 (4), pp 1307-1311.

[*] 1 µg/L is equivalent to 0.000001 g/L or 1 part per billion (ppb)

Health Significance of the Survey Results

The provisional tolerable daily intake (TDI) of 25 µg/kg body weight/day has been pre-established by Health Canada as a conservatively safe level for BPA presence in food.

Based on the average BPA level in canned drinks (0.57 µg/L[*]), if an adult (60 kg body weight) consumes one canned drink (355 mL) per day, the dietary intake of BPA would be equivalent to 0.2 µg/day which represents 0.0135% of the provisional TDI. Based on the highest BPA level in canned drinks (4.5 µg/L*), an adult (60 kg body weight) would have to consume approximately 940 canned drinks in one day to approach the provisional TDI set by Health Canada.

The results of this survey clearly indicate that exposure to BPA through the consumption of canned drink products would be extremely low. The low levels of BPA found in canned drink products available for sale in Canada 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.

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[*] 1 µg/L is equivalent to 0.000001 g/L or 1 part per billion (ppb)

Table 1: Concentrations (µg/L) of BPA in canned drink 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 bisphenol A in canned drink products or as indices of good product choices for consumers

Company name	Brand name	Product name	BPA concentration (µg/L)
A&W Food Services of Canada Inc.	A & W	A & W Famous Root Beer	0.21
		Diet A & W Famous Root Beer, Sugar-Free	0.41
Canada Dry Mott's Inc. / Dr. Pepper Snapple Group	Canada Dry	Canada Dry, Ginger Ale	0.23
		Diet Canada Dry, Ginger Ale	1.7
		Canada Dry, Lemon Ginger Ale	0.16
	C Plus	C Plus Orange Burst, Contains Sunkist Juice	1.1
	Crush	Crush Cream Soda	0.045
		Diet Crush Cream Soda	0.047
		Crush Orange	0.48
		Diet Crush Orange	0.46
	Dr. Pepper	Dr. Pepper	0.10
		Diet Dr. Pepper, Sugar-Free	0.032
	Hires	Hires Root Beer Soft Drink	0.30
	Schweppes	Schweppes Ginger Ale	0.048
		Schweppes Ginger Ale	0.22
		Diet Schweppes Ginger Ale	0.065
		Schweppes Club Soda	0.048
	Vernors	Vernors, The Original Ginger Soda	0.071
		Diet Vernors Sugar Free Ginger Soda	0.061
Coca-Cola Ltd	Barq's	Barq's Root Beer	0.22
	Coke	Coke	0.18
		Diet Coke	0.35
	Fresca	Sugar-Free Fresca, Natural and Artificial Grapefruit Flavoured Beverage	1.1
		Sugar-free Fresca, Natural and Artificial Cherry Citrus Flavoured Sparkling Soda	0.75
	Full Throttle	Full Throttle Fury Energy Drink, Tropical Flavoured	0.60
	Sprite	Sprite	0.17
	Tab	Tab Energy Drink, Sugar-Free, Cherry Flavoured	0.18

COTT Beverage Canada	Red Rain	Red Rain Energy Drink, White	0.072
DD Beverage Co.	Canadian Beaver Buzz	Canadian Beaver Buzz Citrus Energy Drink	0.10
Loblaws Inc.	President's Choice	President's Choice Cranberry Sparkling Soda	0.15
		President's Choice Diet Cranberry Sparkling Soda	0.23
		President's Choice Cranberry Raspberry Sparkling Soda	0.25
		President's Choice Diet Cranberry Raspberry Sparkling Soda	0.21
		President's Choice Diet Cola	0.49
		President's Choice Diet Cola, Low Sodium, Caffeine-Free	1.6
		President's Choice New Wave Diet Cola, Low Sodium, Caffeine-Free	2.2
		President's Choice Ginger Ale	1.0
		President's Choice Grape Soda	0.16
		President's Choice Green Apple Sparkling Soda	0.21
		President's Choice Diet Green Apple Sparkling Soda	0.27
		President's Choice Lemon Iced Tea	0.45
		President's Choice Diet Lemonade Sparkling Soda	1.5
		President's Choice Mountain Mania, Citrus Soda	2.3
		President's Choice Orange Soda	0.95
		President's Choice Root Beer	0.44
		President's Choice Spritz Up - Lemon-Lime Soda	0.33
		President's Choice Diet Spritz Up - Lemon-Lime Soda	0.27
Lost International	Lost Energy Drink	Lost Five-O Energy Drink + Juice	4.2
Monster Beverage Canada	Monster Energy	Monster Energy Drink	0.29
		Monster Energy Drink, Reduced Carb	0.24
		Monster Energy Drink + Juice	1.3
PepsiCo Canada ULC	Dew	Dew Fuel Energy Drink	0.40
	Dole	Dole Sparklers - Orange	0.48
		Dole Sparklers - Cranberry Raspberry	0.12
	Mountain Dew	Mountain Dew	0.47
	Mug	Mug Root Beer	0.16
	Pepsi	Pepsi	0.12
		Diet Pepsi	0.56
	7 Up	7 Up	1.0
		Diet 7 Up	0.32
	Tropicana	Tropicana Twister - Fruit Fusion	0.13
		Tropicana Twister - Lemonade Splash	0.23
		Tropicana Twister - Orange Citrus Swirl	0.45
		Tropicana Twister - Strawberry Spiral	0.088
Rockstar Co.	Rockstar	Rockstar Energy Drink	4.5
		Diet Rockstar Energy Drink	1.0
Unilever Canada / PepsiCo Canada	Lipton	Lipton Green Tea with Citrus	0.075
		Lipton Iced Tea, Lemon	0.21
		Diet Lipton Iced Tea, Sugar-Free, Diet Lemon	0.63