

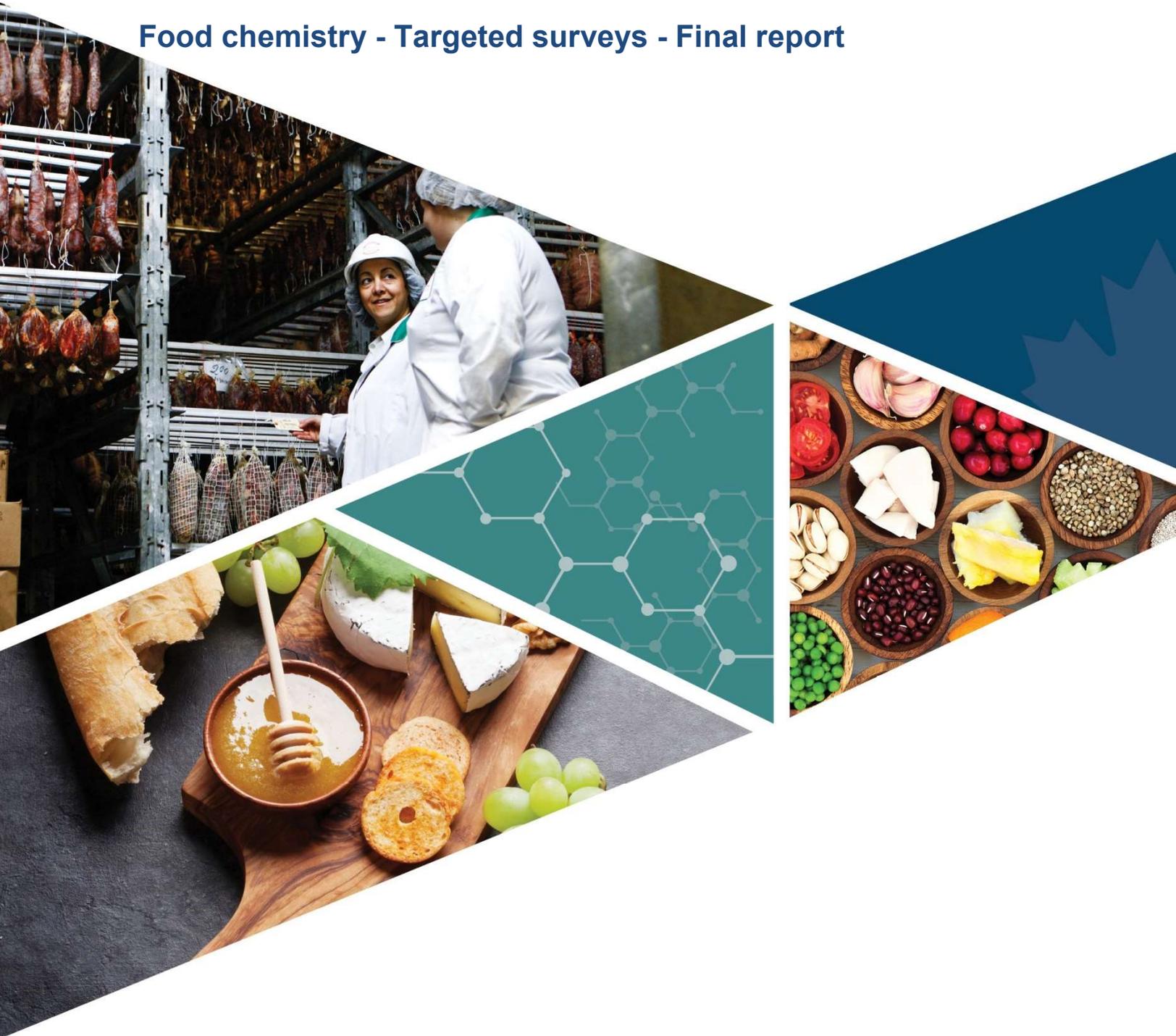


Canadian Food  
Inspection Agency

Agence canadienne  
d'inspection des aliments

# Ethyl Carbamate in Alcoholic and Non-alcoholic Beverages, Vinegars, Grain Based Breads and Crackers and Soy Based Products - April 1, 2016 to March 31, 2018 and April 1, 2020 to March 31, 2022

## Food chemistry - Targeted surveys - Final report



## Summary

Targeted surveys provide information on potential food hazards and enhance the Canadian Food Inspection Agency's (CFIA's) routine monitoring programs. These surveys provide evidence regarding the safety of the food supply, identify potential emerging hazards, and contribute new information and data to food categories where it may be limited or non-existent. They are often used by the agency to focus surveillance on potential areas of higher risk. Surveys can also help to identify trends and provide information about how industry complies with Canadian regulations.

Ethyl carbamate (EC) is a chemical that unintentionally forms during the fermentation process. It can be found in alcoholic beverages and fermented foods such as bread, yogurt, soy products and fermented vegetables<sup>1,2,3</sup>. EC levels in these products can be affected by a wide range of factors, including processing and storage temperature, strain of yeast used, crop fertilization and exposure to sunlight<sup>2,3,4,5,6</sup>. This compound is classified as 'probably carcinogenic to humans' by the International Agency for Research on Cancer (IARC)<sup>7</sup>, and therefore may pose a health risk to the consumer.

This targeted survey generated further baseline surveillance data on the occurrence of EC in domestic and imported products on the Canadian market. The CFIA sampled and analyzed 1488 fermented products, including 615 alcoholic and 133 non-alcoholic beverages, 133 culinary vinegars, 286 grain based bread and cracker products and 404 soy based products. EC was detected in 14% of the samples tested, with levels ranging from 4.0 parts per billion (ppb) to 520 ppb. The highest level of EC was reported in an imported fermented bean curd sample. Comparison of the survey results to previous surveys and scientific literature showed that the levels of EC in Canadian retail products are similar to those reported in a variety of scientific studies.

Health Canada determined the levels of EC in food observed in this survey are not expected to pose a concern to human health, therefore there were no follow-up actions resulting from this survey.

## What are targeted surveys

Targeted surveys are used by the CFIA to focus its surveillance activities on areas of highest health risk. The information gained from these surveys provides support for the allocation and prioritization of the agency's activities to areas of greater concern. Originally started as a project under the Food Safety Action Plan (FSAP), targeted surveys have been embedded in our regular surveillance activities since 2013. Targeted surveys are a valuable tool for generating information on certain hazards in foods, identifying and characterizing new and emerging hazards, informing trend analysis, prompting and refining health risk assessments, highlighting potential contamination issues, as well as assessing and promoting compliance with Canadian regulations.

Food safety is a shared responsibility. We work with federal, provincial, territorial and municipal governments and provide regulatory oversight of the food industry to promote safe handling of foods throughout the food production chain. The food industry and retail sectors in Canada are responsible for the food they produce and sell, while individual consumers are responsible for the safe handling of the food they have in their possession.

## Why did we conduct this survey

The main objectives of this targeted survey were to generate further baseline surveillance data on the level of EC in alcoholic and no-alcoholic beverages, culinary vinegars, grain based breads and cracker and soy products on the Canadian retail market, and to compare the prevalence of EC in foods targeted in this survey with that of similar products in other targeted surveys and scientific literature.

EC is formed unintentionally during fermentation by the spontaneous reaction of urea and ethanol. During fermentation, some strains of yeast naturally produce urea and ethanol, which can react together to form EC<sup>3,4</sup>. EC levels in foods can be affected by a wide range of factors, including processing and storage temperature, strain of yeast present, crop fertilization and exposure to sunlight<sup>2,3,4,5,6</sup>.

EC is classified as 'probably carcinogenic to humans' by the International Agency for Research on Cancer (IARC)<sup>7</sup>. As such, Health Canada has set in place Maximum Levels (ML) for EC in various alcoholic beverages<sup>8</sup>. Due to this potential health risk, the CFIA considered it important to examine EC levels in other fermented foods available on the Canadian retail market.

## What did we sample

A variety of domestic and imported fermented products including alcoholic and no-alcoholic beverages, culinary vinegars, grain based breads and cracker and soy products were sampled

from April 1 to March 31 over the following survey years: 2016, 2017, 2020, and 2021. Samples of products were collected from local/regional retail locations located in 11 major cities across Canada. These cities encompassed 4 Canadian geographical areas:

- Atlantic (Halifax and Moncton)
- Quebec (Montreal and Quebec City)
- Ontario (Toronto and Ottawa)
- West (Calgary, Saskatoon, Vancouver, Victoria and Winnipeg)

The number of samples collected from these cities was in proportion to the relative population of the respective areas. The shelf life, storage conditions, and the cost of food on the open market were not considered in this survey. Refer to Table 1 for the product types collected in this survey.

**Table 1. Distribution of survey samples based on product type and origin**

Product type	Number of domestic samples	Number of imported samples	Number of samples of unspecified origin <sup>a</sup>	Total number of samples
Alcoholic beverages	206	336	73	615
Non-alcoholic beverages	50	64	19	133
Culinary vinegars	2	38	10	50
Grain based breads and crackers	58	66	162	286
Soy based products	113	227	64	404
<b>Total</b>	<b>429</b>	<b>731</b>	<b>328</b>	<b>1488</b>

<sup>a</sup> Unspecified refers to those samples for which a country of origin could not be assigned from the product label or available sample information

## How were samples analyzed and assessed

Samples were analyzed by an ISO 17025 accredited food testing laboratory under contract with the Government of Canada. The results are based on the food products as sold and not necessarily as they would be consumed.

Chemical contaminants in foods have regulatory levels established by Health Canada. Currently, these have been established for the presence of EC in certain types of alcoholic beverages. Health Canada has determined a maximum level (ML) of 35 ppb for EC in table wine, 100 ppb in fortified wines, 150 ppb in distilled spirits, 400 ppb in fruit brandies and liqueurs and 200 ppb in sake (rice wine)<sup>8</sup>. Refer to Appendix A, Table A-1 for tabular format of MLs in alcoholic beverages established by Health Canada. Compliance is assessed against the established ML available when the survey was carried out. In the absence of a specific ML, the levels of EC may be assessed by Health Canada on a case-by-case basis using the most current scientific data. Any high results of EC are reviewed by Health Canada's Bureau of Chemical Safety to determine if the levels are harmful to consumers. Note that there are no Canadian regulatory limits for the remaining categories of products included in the survey.

# What were the survey results

Of the 1488 samples tested, most (86%) did not have detected levels of EC. Table 2 illustrates the range of concentrations detected in the survey samples by product type.

**Table 2. Overview of targeted survey results in 2016, 2017, 2020 and 2021**

Product type <sup>b</sup>	Number of samples	Number of samples (%) with detected levels	Minimum <sup>c</sup> (ppb)	Maximum (ppb)	Average <sup>d,e</sup> (ppb)
Alcoholic beverages	614	170 (28)	4.0	128	21.9
Non-alcoholic beverages	134	2 (2)	6.0	7.0	6.5
Culinary vinegars	50	0 (0)	0	0	0
Grain based breads and crackers	286	0 (0)	0	0	0
Soy based products	404	37 (9)	4.0	520	67.8
<b>Total</b>	<b>1488</b>	<b>209 (14)</b>	<b>4.0</b>	<b>520</b>	<b>29.9</b>

<sup>b</sup> Refer to Appendix A, Table A-2 for a breakdown of product types, number of samples tested and percent positive

<sup>c</sup> Note that the minimum level of detection for the analytical testing method was 4.0 ppb

<sup>d</sup> Only positive results were used to calculate average EC levels

<sup>e</sup> Refer to Appendix A, Table A-3 for a breakdown of product types, minimum, maximum and average levels detected, as well as percent positive samples (detection rate) in survey samples

## Alcoholic beverages

A wide variety of alcoholic beverages and distilled spirits were sampled within the following the following categories: 135 ciders, 151 distilled spirits, 65 fortified wines, 21 fruit brandies, 27 liqueurs, 54 sakes (rice wine) and 161 table wines. The highest level of EC was found in an imported sake wine (15.5% alcohol) at 128 ppb which was below Health Canada’s ML of 200 ppb. All other alcoholic beverage samples that tested positive for EC were found to contain levels below the MLs, with the exception of 1 imported fortified plum wine (14% alcohol) which exceeded the ML of 100 ppb at 127ppb. Within the category of fortified wines, the compliance rate was 64 out of 65 samples screened or 98.5%, and 100% for all other categories of alcoholic beverages as no other samples exceeded the ML. Refer to Appendix A, Table A-1 for a detailed breakdown of the minimum, maximum, average levels of EC detected within each category of alcoholic beverages in ppb, as well as the number of compliant samples and percent compliance.

Although the rate of detection (percent positive samples) for alcoholic beverages is highest across all product types in Table 2, the majority of samples (72%) did not contain EC and the average level of EC detected was well below the ML and the maximum level detected. Refer to Appendix A, Table A-3 for additional detection rates.

## **Non-alcoholic beverages**

A total of 134 non-alcoholic beverages were tested and included: 15 non-alcoholic ciders, 19 non-alcoholic table wines, 35 soft drinks and 65 fermented beverages; 52 of which were kombucha. Of the products tested, 2 samples were observed to contain EC levels, 1 of which was an imported de-alcoholized wine product at 7.0 ppb, and the other was in an imported fermented kombucha beverage at 6.0 ppb. Note that there were 19 non-alcoholic (de-alcoholized) wine samples tested, and 52 kombucha samples tested in this survey. The majority of samples tested in the non-alcoholic beverages category (98%) did not test positive for EC.

## **Culinary vinegars**

A total of 50 culinary or cooking vinegars were tested. The category included 23 apple cider vinegars, 6 balsamic, 16 wine vinegars and 5 grain vinegars (grain and rice). There was a 0% detection rate for EC in culinary vinegars in this targeted survey.

## **Grain based breads and crackers**

A total of 286 grain based products were tested. The products tested included 47 breads/buns, 44 bagels, 41 english muffins/crumpets, 36 flatbreads and 119 crackers/crisps. None of the grain based samples tested contained detectable levels of EC.

## **Soy based Products**

A total of 404 fermented soy products were tested. Product categories tested included: 74 soy sauces, 186 plant based protein sources (e.g., tofu or tempeh), and 143 bean: curds, pastes, spreads and miso. In total, 37 samples were found to contain levels of EC ranging from 4 to 520 ppb. All of the samples that tested positive were imported products with the exception of 1 domestic plant-based protein product in which EC was detected at 7 ppb.

The highest levels of EC were detected in the soy product sub-category of bean curds. Of the 20 bean curds tested, 14 or 70% tested positive for EC and values ranged 19 ppb to 520 ppb, with 7 samples equal to or exceeding 100 ppb. All of the bean curds that contained EC were imported products outside of Canada and the United States.

# **What do the survey results mean**

The main objectives of this targeted survey were to expand upon the baseline data regarding the levels of EC in selected fermented foods on the Canadian retail market. The detection rates and the levels recorded for EC in the products tested in this targeted survey were comparable to those previously found in similar product types in previous surveys and in the scientific literature<sup>9,10,11,12,13,14,15,16</sup>. Refer to Table 3 below. Some differences observed may be due to the specific type of product tested or the sample size.

**Table 3. Minimum, maximum and average concentration levels of ethyl carbamate for alcoholic and non-alcoholic beverages, culinary vinegars, grain based breads and crackers and soy product categories across CFIA survey years 2016, 2017, 2020 and 2021**

Product type	Study <sup>f</sup>	Number of samples	Number of samples (%) with detected levels	Minimum (ppb)	Maximum (ppb)	Average <sup>g</sup> (ppb)
Alcoholic beverages	CFIA, 2021	108	53 (49)	4.2	128	23.8 <sup>g</sup>
Alcoholic beverages	CFIA, 2020	79	58 (73)	4.0	100	25.7 <sup>g</sup>
Alcoholic beverages	CFIA, 2018 <sup>f</sup>	265	31 (12)	4.0	86.0	14.8 <sup>g</sup>
Alcoholic beverages	CFIA, 2017	137	41 (30)	4.0	127	19.5 <sup>g</sup>
Alcoholic beverages	CFIA, 2016	290	18 (6)	4.0	19.0	9.7 <sup>f</sup>
Non-alcoholic beverages	CFIA, 2020	100	1 (1)	6.0	6.0	N/A <sup>h</sup>
Non-alcoholic beverages	CFIA, 2016	34	1 (3)	7.0	7.0	N/A <sup>h</sup>
Non-alcoholic beverages	Tang et al., 2011	75	40 (53)	N/D <sup>i</sup>	15.0	1.1
Non-alcoholic beverages	Wang and Yen, 1998	22	N/A <sup>h</sup>	N/D <sup>i</sup>	53.2	2.8 <sup>j</sup>
Culinary vinegars	CFIA, 2020	50	0 (0)	0	0	0
Culinary vinegars	CFIA, 2018	125	6 (5)	6.0	135	29.5 <sup>g</sup>
Culinary vinegars	Kim et al., 2000	5	N/A <sup>h</sup>	0.3	2.5	1.2
Culinary vinegars	Diachenko et al., 1992	6	N/A <sup>h</sup>	4.0	26.0	8.8
Grains based breads and crackers	CFIA, 2017	286	0 (0)	0	0	0
Grains based breads and crackers	Tang et al., 2011	40	25 (63)	N/D <sup>i</sup>	8.6	2.0
Grains based breads and crackers	Haddon et al., 1994	21	21 (100)	1.3	2.9	2.0 <sup>g</sup>
Grains based breads and crackers	Vahl, 1993	33	33 (100)	0.8	12.0	3.4 <sup>g</sup>
Soy based products	CFIA, 2021	156	2 (1)	5.5	100	52.8 <sup>g</sup>
Soy based products	CFIA, 2020	73	9 (12)	16.5	520	145 <sup>g</sup>
Soy based products	CFIA, 2019 <sup>f</sup>	100	6 (6)	4.0	217	74.1 <sup>g</sup>
Soy based products	CFIA, 2016	175	26 (15)	4.0	328	42.3 <sup>g</sup>

<sup>f</sup> Previous CFIA Survey

<sup>g</sup> Only positive results were used to calculate average EC levels

<sup>h</sup> N/A: Not available

<sup>i</sup> N/D: Not detected at or above the method detection limit

<sup>j</sup> Mean of means from reference data shown for display purposes

The levels of EC observed in this survey were within the range reported in the literature in similar products<sup>9,10,11,12,13,14,15,16</sup>. The larger sample sizes in this multi-year survey confirms that the occurrence of EC in products available on the Canadian market is low across product categories. The overall compliance rate for all alcoholic beverages with ML's included in this survey was 99.8%, which was due to one fortified wine sample exceeding the ML by 27 ppb, as noted in Appendix A, Table A-1.

Health Canada determined the levels of EC in food observed in this multi year survey are not expected to pose a concern to human health, therefore there were no product recalls resulting from this survey. Future EC surveys will look to broaden the CFIA's baseline knowledge on the levels present in fermented soy products and cooking wines.

# References

1. [Archived – Food and Manufactured Food Program Inspection Manual. Chapter 4: Food Safety Hazards.](#) (2014). Canada. Canadian Food Inspection Agency.
2. [Opinion of the Scientific Panel on Contaminants in the Food Chain on a Request from The European Commission on Ethyl Carbamate and Hydrocyanic Acid in Food and Beverages.](#) (2007). The EFSA Journal, 551, pp. 1-44.
3. [Ethyl Carbamate in Local Fermented Foods.](#) (2009a). Hong Kong. Centre for Food Safety.
4. Crowell, E.A., Mooney, L.A., Ough, C.S. (1988). [Formation of Ethyl Carbamate Precursors During Grape Juice \(Chardonnay\) Fermentation. I. Addition of Amino Acids, Urea, and Ammonia: Effects of Fortification on Intracellular and Extracellular Precursors.](#) American Journal of Enology and Viticulture, 39, pp. 243-249.
5. Cui, K., Lin, J., Wu, Q., Xu, Y., Zhu, Y. (2017). [Urea production by yeasts other than Saccharomyces in food fermentation.](#) FEMS Yeast Research, 17(7).
6. Zhou, K., Siroli, L., Patrignani, F., Sun, Y., Lanciotti, R., Xu, Z. (2019). [Formation of Ethyl Carbamate during the Production Process of Cantonese Soy Sauce.](#) Molecules, 24(8), pp. 1474.
7. [Alcohol Consumption and Ethyl Carbamate.](#) (2010). IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, 96.
8. [Health Canada's Maximum Levels for Chemical Contaminants in Foods.](#) (2018). Canada. Health Canada.
9. Tang, A.S.P., Chung, S.W.C., Kwong, K., Xiao, Y., Chen, M.Y.Y., Ho, Y.Y., Ma, S.W.Y. (2011). [Ethyl carbamate in fermented foods and beverages: dietary exposure of the Hong Kong population in 2007–2008.](#) *Food Additives & Contaminants: Part B*, 4(2), pp. 195-204.
10. Wang, S.H.W., Yen, G.-C. (1998) [Determination of ethyl carbamate in non-alcoholic fermented foods marketed in Taiwan.](#) *Journal of Food and Drug Analysis*, 6(2), pp., 517-527.
11. Kim, Y.K., Koh E., Chung, H.J., Kwon, H. (2000). [Determination of ethyl carbamate in some fermented Korean foods and beverages.](#) *Food Additives and Contaminants*, 17(6), pp. 469-475.
12. Diachenko, G.W., Canas, B.J., Joe, F.L., DiNovi, M. (1992). [Ethyl Carbamate in Alcoholic Beverages and Fermented Foods.](#) *Food Safety Assessment*, Chapter 34, pp. 419-428.
13. Haddon, W.F., Mancini, M.L., McLaren, M., Effio, A., Harden, L.A., Degre, R.L., Bradford, J.L. (1994). [Occurrence of Ethyl Carbamate \(Urethane\) in U.S. and Canadian Breads: Measurements by Gas Chromatography-Mass Spectrometry.](#) *Journal of Cereal Chemistry*, 71(2), pp. 207-215.
14. Vahl, M. M. (1993). [A survey of ethyl carbamate in beverages, bread and acidified milks sold in Denmark.](#) *Journal of Food Additives & Contaminants*, 10(5), pp. 585-592.
15. [Ethyl Carbamate in Alcoholic Beverages and Vinegars - April 1, 2018 to March 31, 2019.](#) (2020). Canada. Canadian Food Inspection Agency.
16. [Ethyl Carbamate in Fermented Vegetables and Soy Products - April 1, 2019 to March 31, 2020.](#) (2022). Canadian Food Inspection Agency.

## Appendix A

**Table A-1. Summary of results for the current targeted survey years: 2016-17, 2017-18, 2020-21 and 2021-22 and percent compliance with Health Canada maximum levels for ethyl carbamate in alcoholic beverages in parts per billion (ppb)<sup>8</sup>**

Alcoholic beverage	Maximum levels (ML) of ethyl carbamate in parts per billion (ppb)	Number of samples	Number of positive samples	Minimum (ppb)	Maximum (ppb)	Average <sup>k</sup> (ppb)	Number of compliant samples	Percent (%) of compliant samples
Table wines	35	161	18	4.0	19.0	9.3	161	100
Fortified wines	100	65	16	5	127	24.6	64	98.5
Sakes (rice wines)	200	54	23	5.0	128	50.2	54	100
Distilled spirits	150	151	99	4.0	97.0	17.0	151	100
Fruit brandies	400	21	11	5.0	98.2	25.0	21	100
Liqueurs	400	27	1	23.0	23.0	N/A <sup>l</sup>	27	100
<b>Total</b>	35 to 400	<b>479</b>	<b>168</b>	<b>4.0</b>	<b>128</b>	<b>22.0</b>	<b>478</b>	<b>99.8</b>

<sup>k</sup> Average excludes alcoholic ciders in the absence of an ML

<sup>l</sup> Average is not available as only 1 sample contained detected levels of EC

**Table A-2. Breakdown of targeted survey product categories, number of samples tested, number of positive detected results and percent of samples positive for ethyl carbamate**

Product category details	Number of survey samples tested	Number of positive samples	Percent positive samples <sup>1</sup> (%)
<b>Alcoholic beverage products</b>	<b>614</b>	<b>170</b>	<b>28</b>
<b>Beverage - alcoholic - table wine</b>	<b>161</b>	<b>18</b>	<b>11</b>
<b>Beverage - alcoholic - cider</b>	<b>135</b>	<b>2</b>	<b>1</b>
alcoholic - cider (apple)	88	2	
alcoholic - cider (pear)	30	0	
alcoholic - cider (other fruit)	17	0	
<b>Beverage - alcoholic - liqueur</b>	<b>27</b>	<b>1</b>	<b>4</b>
<b>Beverage - alcoholic - fortified wine</b>	<b>65</b>	<b>16</b>	<b>25</b>
Alcoholic - wine - fortified (port)	31	5	
Alcoholic - wine - fortified (sherry)	20	8	
Alcoholic - wine - fortified (madeira)	4	1	
Alcoholic - wine - fortified (marsala)	7	1	
Alcoholic - wine - fortified (plum)	2	1	
Alcoholic - wine - fortified (blueberry)	1	0	
<b>Beverage - alcoholic - brandy</b>	<b>21</b>	<b>11</b>	<b>52</b>
<b>Beverage - alcoholic spirits - whiskey</b>	<b>151</b>	<b>99</b>	<b>66</b>
alcoholic - whiskey (bourbon)	24	22	92
alcoholic - whiskey (irish)	12	5	
alcoholic - whiskey (rum)	1	0	
alcoholic - whiskey (rye)	84	66	79
alcoholic - whiskey (scotch)	17	6	35
alcoholic - whiskey (vodka)	2	0	
alcoholic - whiskey (other)	11	0	
<b>Beverage - alcoholic - sake (rice wine)</b>	<b>54</b>	<b>23</b>	<b>43</b>
<b>Non-alcoholic beverage products</b>	<b>134</b>	<b>2</b>	<b>1</b>
non-alcoholic -cider (apple)	15		
non-alcoholic - wine (de-alcoholized)	19	1	5
non-alcoholic - soft drink (various types and flavors)	35		
non-alcoholic - kombucha	52	1	2
non-alcoholic - kefir, kvas, dairy, other	13		

<b>Product category details</b>	<b>Number of survey samples tested</b>	<b>Number of positive samples</b>	<b>Percent positive samples<sup>1</sup> (%)</b>
<b>Culinary vinegar products</b>	<b>50</b>	<b>0</b>	<b>0</b>
Vinegar - apple cider	23	0	
Vinegar - balsamic	6	0	
Vinegar - wine	16	0	
Vinegar - grain	5	0	
<b>Grain-based products</b>	<b>286</b>	<b>0</b>	<b>0</b>
Grain-based - bread and bun	47	0	
Grain-based - bagel	44	0	
Grain-based - flatbread, naan, pita, tortilla, wrap	35	0	
Grain-based - crumpet, english muffin	41	0	
Grain-based - cracker, crisp, toast	119	0	
<b>Soy based products</b>	<b>404</b>	<b>37</b>	<b>9</b>
<b>Soy based product - soy sauce</b>	<b>75</b>	<b>16</b>	<b>21</b>
<b>Soy based product - plant based protein sources</b>	<b>186</b>	<b>1</b>	<b>1</b>
Soy based - (tofu)	93	0	
Soy based - (tempeh)	54	0	
Soy based - vegetable protein (other)	5	1	
Soy based - vegetable protein (textured)	7	0	
Soy based - (burger, bacon, meatballs)	27	0	
<b>Soy product - beans, curds, pastes, spreads, miso</b>	<b>143</b>	<b>20</b>	<b>14</b>
Soy based - bean curd	20	14	70
Soy based - miso	77	1	1
Soy based - soy and black bean paste, spreads	46	5	11
<b>Total<sup>m</sup></b>	<b>1488</b>	<b>209</b>	<b>14</b>

<sup>1</sup> Only main category values were used, and include subcategory totals

<sup>m</sup> Only positive results were used to calculate average EC levels

**Table A-3. Breakdown of targeted survey product category numbers of samples that tested positive for ethyl carbamate and minimum, maximum and average concentration level detected**

Detailed Product Category	Number of positive samples	Minimum (ppb)	Maximum (ppb)	Average of (ppb)
<b>Alcoholic beverage products</b>	<b>170</b>	<b>4</b>	<b>128</b>	<b>21.9</b>
<b>Beverage - alcoholic - table wine</b>	<b>18</b>	<b>4</b>	<b>19</b>	<b>9.3</b>
<b>Beverage - alcoholic - cider</b>	<b>2</b>	<b>6</b>	<b>17</b>	<b>11.5</b>
alcohol - cider - apple	2	6	17	11.5
<b>Beverage - alcoholic - liqueur</b>	<b>1</b>	<b>23</b>	<b>23</b>	<b>23.0</b>
<b>Beverage - alcoholic - fortified wine</b>	<b>16</b>	<b>5</b>	<b>127</b>	<b>24.6</b>
alcohol - wine - fortified (port)	5	5	11	7.6
alcohol - wine - fortified (sherry)	8	7	41	20.9
alcohol - wine - fortified (madeira)	1	28	28	28
alcohol - wine - fortified (marsala)	1	34	34	34
alcohol - wine - fortified (plum)	1	127	127	127
<b>Beverage - alcoholic - brandy</b>	<b>11</b>	<b>5</b>	<b>98.2</b>	<b>25</b>
<b>Beverage - alcoholic spirits - whiskey</b>	<b>99</b>	<b>4</b>	<b>97</b>	<b>17.0</b>
alcohol - whiskey (bourbon)	22	8.6	97	25.1
alcohol - whiskey (Irish)	5	4.2	33	11.5
alcohol - whiskey (rye)	66	4	84.5	15.5
alcohol - whiskey (scotch)	6	5.3	14	8.7
<b>Beverage - alcoholic - sake (rice wine)</b>	<b>23</b>	<b>5</b>	<b>128</b>	<b>50.2</b>
<b>Soy based products</b>	<b>37</b>	<b>4</b>	<b>520</b>	<b>67.8</b>
<b>Soy based product - soy sauce</b>	<b>16</b>	<b>4</b>	<b>57.1</b>	<b>13.5</b>
<b>Soy based product - plant based protein sources</b>	<b>1</b>	<b>7</b>	<b>7</b>	<b>7</b>
soy based - vegetable protein (other)	1	7	7	7
<b>Soy Products - beans, curds, pastes, spreads, miso</b>	<b>20</b>	<b>5.5</b>	<b>520</b>	<b>114</b>
bean curd	14	19	520	154
miso	1	37.1	37.1	37.1
soy and black bean pastes and spreads	5	5.5	40	19.4
<b>Non-alcoholic beverage products</b>	<b>2</b>	<b>6</b>	<b>7</b>	<b>6.5</b>
<b>Beverage - non-alcoholic - wine</b>	<b>1</b>	<b>7</b>	<b>7</b>	<b>7</b>
<b>Beverage - non-alcoholic - kombucha</b>	<b>1</b>	<b>6</b>	<b>6</b>	<b>6</b>
<b>Total</b>	<b>209</b>	<b>4</b>	<b>520</b>	<b>29.9</b>