

Guidelines on the Use of Aluminium- containing Food Additives

November 2016 (Revised)

Purpose

The Guidelines set out principles for the use of aluminium-containing food additives in food production and provide recommendations to the trade for reducing aluminium content in food products. The Guidelines are applicable to all manufacturers and producers (including restaurants and bakeries).

Background

2. The Joint Food and Agriculture Organization / World Health Organization Expert Committee on Food Additives (JECFA) re-evaluated the safety of aluminium in 2011 and revised the provisional tolerable weekly intake (PTWI) from 1 mg/kg body weight (bw) to 2 mg/kg bw for aluminium (including additives).

3. In view of the JECFA's safety evaluation of aluminium, public concern and a lack of local data on the situation of food containing aluminium-containing food additives, the Centre for Food Safety (CFS) conducted the first study on "Aluminium in Food" and released the report in 2009. In 2016, the CFS released the results of a follow up study aiming to examine the levels of aluminium in food products which were shown to contain moderate to high levels of aluminium in the previous study. The study also examined the use of aluminium-containing food additives in these products, compared the levels of aluminium in foods between the two studies and estimated the dietary exposure to aluminium of the population in Hong Kong and the associated health risk.

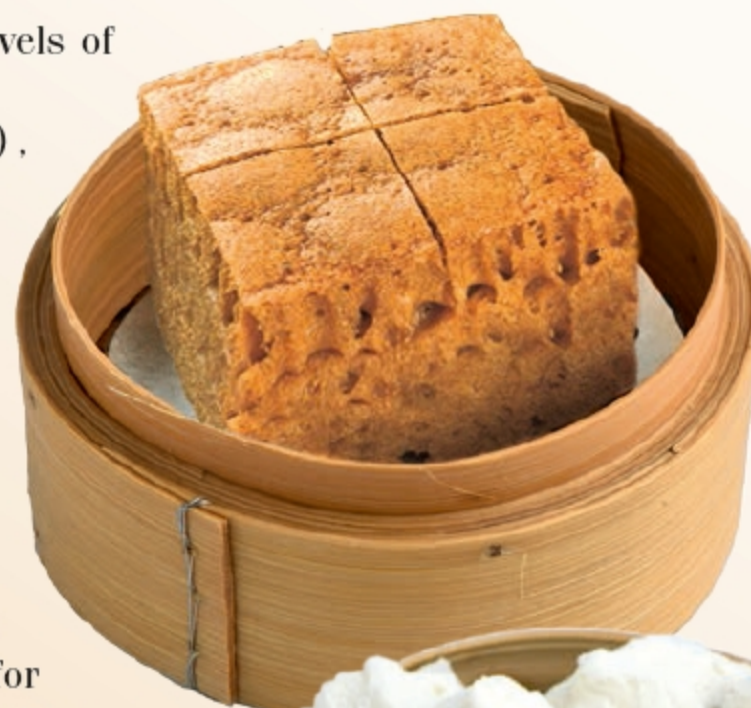
4. The follow up study revealed that aluminium-containing food additives are widely used in the production of steamed bread/bun/cake, some bakery products such as egg waffle and waffle as well as jellyfish. Generally speaking, more food items showed a decrease in the mean aluminium concentration within the same food group when comparing to the previous study, except "steamed bread/bun/cake". 73% of food items in the food group "steamed bread/bun/cake" showed an increase in the mean aluminium concentration, ranging from 4% to 75%. Based on the results of the follow up study, the average and high consumers of the general population were unlikely to experience major undesirable health effects of aluminium. Nevertheless, for consumers with brand loyalty to products with high aluminium contents, adverse health effect of aluminium cannot be ruled out. To protect public health, efforts should be made to reduce exposure to aluminium for the population.

5. Examples of food items that were found with relatively high levels of aluminium in the follow up study are listed below:

- Steamed bread/bun/cake such as "Mai Lai" cake (馬拉糕), thousand layer steamed cake (千層糕) and chicken bun (雞包仔)
- Bakery products such as egg waffle (雞蛋仔) and waffle
- Jellyfish

6. The study reports on "Aluminium in Food" can be found at the webpage of CFS <www.cfs.gov.hk/english/programme/programme_rafs/programme_rafs_fa_01.html>.

7. Members of the trade should share the responsibility to protect public health and make efforts to reduce exposure to aluminium for the population. Hence, members of the trade should adopt the Guidelines where appropriate to reduce the aluminium content of their products. The Government will continue to keep in view the international development on standard setting in this aspect. The Guidelines will be reviewed as appropriate.



About Aluminium-containing Food Additives

8. Aluminium-containing food additives have been used in food processing for over a century, e.g. as firming agent, raising agent, stabiliser, anticaking agent and colouring matter.

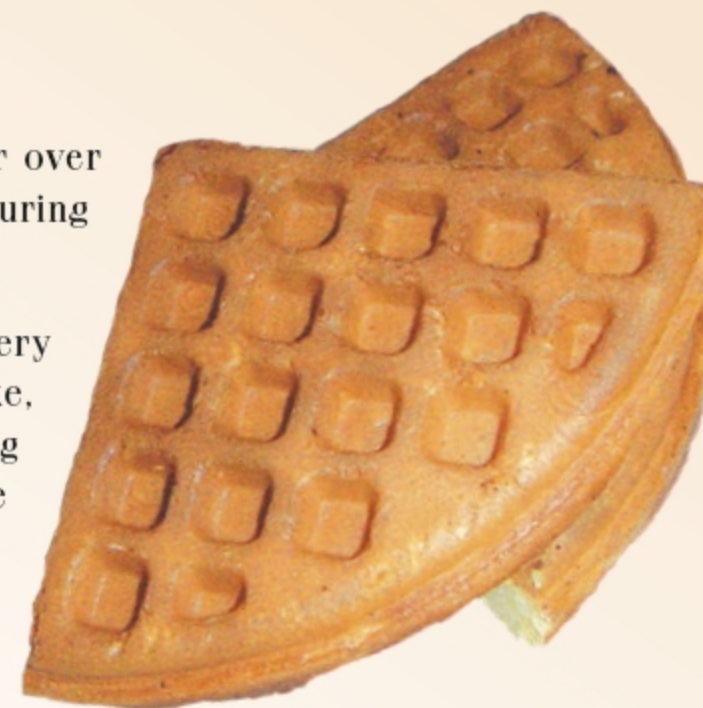
9. Baking powder is commonly used as raising agent in the production of bakery products such as cake and muffin, and steamed floury products such as steamed cake, steamed bun and steamed bread, and its application and use levels may vary among products, as well as, among manufacturers. However, certain products such as white bread, wheat bread and some rolls are commonly produced by other means such as yeast fermentation. Baking powder typically has three components namely acid, alkaline and filler. Sodium hydrogen carbonate (INS* no. 500(ii)), also known as baking soda, is commonly used as the alkaline component in baking powder. It is readily soluble in water and reacts with the acidic component to form carbon dioxide, which then raises the baking products. The rate of reaction largely depends on the rate of dissolution of the acidic component in the baking powder. An acid in a baking powder can generally be categorised into “fast acting” or “slow acting” ones. Generally speaking, a fast acting acid reacts with dissolved sodium hydrogen carbonate at room temperature while a slow acting acid will react until the temperature is raised to certain degree e.g. when baking in the oven. The combinations of the slow and fast acting acids give rise to the double acting baking powder. Some aluminium-containing food additive e.g. sodium aluminium phosphate (acidic) (INS no. 541(i)) may be used as the slow acting acid in baking powder. Owing to the use of aluminium-containing food additives, high levels of aluminium would be expected in the final product, but the residual levels of aluminium may vary, depending on the levels used.

10. Aluminium potassium sulphate (INS no. 522), also known as alum, is a kind of additive used to produce salted jellyfish. Salted jellyfish is produced from fresh jellyfish after caught by traditional processing involving a multi-phase procedure using a mixture of salt and alum to reduce the water content and firm the texture. Jellyfish dish is prepared from salted jellyfish by desalting and rehydrating in water. Extremely high levels of aluminium would still be remained in the jellyfish dish.

11. Some aluminium-containing food additives are generally permitted to be used in food in many countries such as the US, the EU, Australia, New Zealand, Japan and Mainland China, etc. In Mainland China, “Standards for uses of food additives” (GB 2760 – 2014) includes provisions for some aluminium-containing food additives, in which a maximum aluminium residual level of 100 mg/kg in dry weight is established for some aluminium-containing food additives in various food. Examples of provisions are listed in Annex 1. On the other hand, according to the aquatic industrial standard for “Salted jellyfish and salted jellyfish head” (SC/T 3210 – 2015), the standard for alum in these products is set at not more than 1.8%. It should be noted that these are not recommended local standards, but merely serve as reference for the trade. These levels might still be high, with reference to the newly established PTWI, and these standards might be subject to change in the future.

12. In the international arena, some aluminium-containing food additives have been included in the Codex General Standard for Food Additives (GSFA) as shown in Annex 2. In response to the latest revision of PTWI for aluminium to 2 mg/kg bw in 2011, the JECFA recommended that provisions for aluminium-containing food additives included in the GSFA should be compatible with the revised PTWI for aluminium compounds of 2 mg/kg bw/wk as aluminium from all sources. In order to limit the exposure to aluminium among adults and children, Codex Committee on Food Additives (CCFA) has recommended decreasing the use of aluminium-containing food additives to the extent possible. To achieve the purpose, the CCFA recommended that all provisions for aluminium-containing food additives should be numerical and expressed on an aluminium basis. Meanwhile, provisions and draft provisions for some aluminium-containing food additives should be revoked and discontinued respectively. The trade is advised to observe the latest development on the standards.

13. In Hong Kong, according to the Colouring Matter in Food Regulations (the Regulation), the aluminium salts (lakes) of any of the permitted water-soluble colours stipulated in the Regulation and aluminium in leaf or powder form solely for external colouring of dragees and decoration of sugar-coated flour confectionery are permitted colouring matters. As for other aluminium-containing food additives, there is no specific subsidiary



* “INS” in full is “International Numbering System for Food Additives” adopted by Codex Alimentarius Commission (Codex).



legislation to govern their uses. However, the Public Health and Municipal Services Ordinance stipulates that all food on sale in Hong Kong must be fit for human consumption. If a prepackaged food contains a food additive including aluminium-containing food additive, such additive should be specified on the label accurately in the prescribed manner stipulated in the Food and Drugs (Composition and Labelling) Regulations.

Basic Principles

14. In order to reduce exposure to aluminium of the population, the guidelines embody the following principles:

Principle 1:

The use of aluminium-containing food additives should be reduced or replaced with other alternatives in preparing food as far as possible.

Principle 2:

Alternative techniques for food processing should be developed to reduce the use of aluminium-containing food additives.



Advice to the Trade

15. The trade is advised to make reference to the following points in the production of food products and modification of the production of existing food products:

Product Development

- i. Limit the application of aluminium-containing food additives in food products.
- ii. Limit the quantities of aluminium-containing food additives added to the lowest possible level necessary to accomplish its desired effect. The quantities added should present no appreciable health risk to consumers. The corresponding aluminium level owing to the use of aluminium-containing food additives could be estimated, based on the use level and the molecular/formula weight of the aluminium-containing food additives. For example, if a product is added with aluminium ammonium sulphate (formular weight: 453.32) at 0.1% w/w (i.e. 1000 mg/kg), the corresponding aluminium level is about 60 mg/kg ($26.98/453.32 \times 1000$). It should be noted that the corresponding aluminium level does not represent the residual level of aluminium in the final product.
- iii. Obtain information or specification of all ingredients from the suppliers about their components and check the components of each ingredient used carefully to see if they contain aluminium-containing food additives.
- iv. Consider to use other alternatives, as far as possible, to replace aluminium-containing food additives in preparing food although there may be cost implication by using alternatives.
- v. Develop alternative techniques to reduce the use of aluminium-containing food additives, such as alum, during the production of salted jellyfish.

Food Production

- i. Check the identity of ingredients added in accordance with the recipe.
- ii. Add the required amount of food additives accurately.

Food Labelling

- i. Ensure to provide accurate information on prepackaged food label including specific food additives used.



Annex 1

Examples of provisions for aluminium-containing food additives in “Standards for uses of food additives” in Mainland China (GB 2760 – 2014) *

- Aluminium potassium sulphate (INS no. 522)
- Aluminium ammonium sulphate (INS no. 523)

Functional class: raising agent, stabiliser

Food Category No.	Food Name	Maximum Use Level	Remarks
04.04	Bean products	GMP	Aluminium residue ≤100 mg/kg (on dry basis, as Al)
06.03.02.04	Batters (e.g. batters for fish or poultry), breader and frying flour	GMP	Aluminium residue ≤100 mg/kg (on dry basis, as Al)
06.03.02.05	Deep fried flour products	GMP	Aluminium residue ≤100 mg/kg (on dry basis, as Al)
06.05.02.02	Shrimp flavoured chips	GMP	Aluminium residue ≤100 mg/kg (on dry basis, as Al)
07.0	Bakery products	GMP	Aluminium residue ≤100 mg/kg (on dry basis, as Al)
09.03.02	Pickled aquatic products (jellyfish only)	GMP	Aluminium residue ≤500 mg/kg (as Al in ready-to-eat jellyfish)

Annex 2

Examples of provisions for aluminium-containing food additives under GSFA of Codex (CODEX STAN 192-1995, version 2016)*

Aluminium ammonium sulphate (INS No. 523)

Functional class: Acidity regulator, colour retention agent, firming agent, raising agent, stabiliser

Food Category No.	Food Category	Maximum Use Level#
04.2.2.3	Vegetables (including mushrooms and fungi, roots and tubers, pulses and legumes, and aloe vera), and seaweeds in vinegar, oil, brine, or soybean sauce	520 mg/kg
06.4.1	Fresh pastas and noodles and like products	300 mg/kg
07.1.2	Crackers, excluding sweet crackers	100 mg/kg
07.1.3	Other ordinary bakery products (e.g. bagels, pita, English muffins)	100 mg/kg
07.1.5	Steamed breads and buns	40 mg/kg
07.1.6	Mixes for bread and ordinary bakery wares	40 mg/kg
09.2.4.2	Cooked mollusks, crustaceans, and echinoderms	200 mg/kg

Sodium aluminium phosphates (INS no. 541)

- Sodium aluminium phosphate, acidic (INS no. 541(i))
Functional class: acidity regulator, emulsifier, emulsifying salt, raising agent, stabiliser, thickener
- Sodium aluminium phosphate, basic (INS no. 541(ii))
Functional class: acidity regulator, emulsifier, emulsifying salt, stabiliser, thickener

Food Category No.	Food Category	Maximum Use Level#
01.6.4	Processed cheese	1600 mg/kg
06.2.1	Flours	1600 mg/kg
06.6	Batters (e.g., for breading or batters for fish or poultry)	1000 mg/kg
07.1.2	Crackers, excluding sweet crackers	100 mg/kg
07.1.3	Other ordinary bakery products (e.g., bagels, pita, English muffins)	100 mg/kg
07.1.5	Steamed breads and buns	40 mg/kg
07.1.6	Mixes for bread and ordinary bakery wares	40 mg/kg

Sodium Aluminosilicate (INS no. 554)

Functional class: anticaking agent

Food Category No.	Food Category	Maximum Use Level#
01.1.4	Flavoured fluid milk drinks	60 mg/kg
01.3.2	Beverage whiteners	570 mg/kg
01.5.1	Milk powder and cream powder (plain)	265 mg/kg
01.5.2	Milk and cream powder analogues	570 mg/kg
01.8.2	Dried whey and whey products, excluding whey cheeses	1140 mg/kg
05.3	Chewing gum	100 mg/kg
12.1.1	Salt	1000 mg/kg
12.2.2	Seasonings and condiments	1000 mg/kg
12.5.2	Mixes for soups and broths	570 mg/kg
12.6.3	Mixes for sauces and gravies	570 mg/kg

* *Examples listed are not exhaustive or complete. It should be noted that these are not recommended food additives /local standards, but merely serve as reference for the trade.*

As aluminium