

UNEXPECTED ALLERGENS IN FOOD

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Allergen Bureau

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1. INTRODUCTION

In Australia and New Zealand, it is a mandatory requirement to declare certain allergens when present in food. The details for these requirements are set out in the Australia New Zealand Food Standards Code (the Code).

Allergens can be present in foods in various ways. They can be added intentionally as: -

- an ingredient; or
- an ingredient of a compound ingredient; or
- a food additive (including its components/ ingredients); or
- a processing aid (including its components/ ingredient).

The Code also requires certain allergens to be declared when they are present as a derivative of such a food. Sometimes identifying the allergen is straightforward (such as peanut oil being a product of peanuts) but quite often it is not immediately evident that allergens are present, particularly when some additives and processing aids are the derivative of an allergen. Examples include the additive lecithin (Food Additive Code number 322) which can be a product of soy, and the processing aid lactoperoxidase which is a milk derived protein.

Allergens can be present in foods in other unexpected ways. Ingredients and foods can be described using technical terminology or names that may not be obviously associated with the allergen. An example is hydrolysed vegetable protein, which can be a product of soy and, in the food industry, is commonly known as HVP. Allergens can be used as part of the manufacturing process, for example, as free flowing agents, lubricants, or clarifying agents. Allergens can also be used as part of an ingredient manufacturing process such as feedstocks and substrates for the growth of bacteria, yeasts, and enzymes.

Allergens may also be present in foods in the form of cross contact. The Allergen Bureau's Voluntary Incidental Trace Allergen Labelling (VITAL®) Program defines cross contact as a residue or other trace amount of a food allergen that is unintentionally incorporated into another food. Some reasons why cross contact may occur are due to: -

- agricultural co-mingling into a raw material; or
- carry over due to using an ingredient that contains cross contact; or
- processes using shared manufacturing equipment or concurrent lines; or
- inadequate cleaning of equipment.

Identifying the allergens present in foods and ingredients can be a complex process which requires consulting with suppliers and obtaining detailed raw material specifications. By ensuring that all allergens, including the unexpected ones, are identified, and included in the product risk assessment, the food industry can meet regulatory requirements, mitigate the need for allergen recalls and withdrawals, and provide important information to consumers with food allergy.

1.1 About this guide

This document (this Guide) provides the food industry with a list of foods, ingredients and raw materials that may unexpectedly contain allergens, and a list of questions food business operators (FBOs) can ask their suppliers which support the allergen risk review process. This Guide is a revised and updated version of the 2011 Unexpected Allergens in Food guide. This edition provides an expanded and updated list of foods, as well as information on food fraud where allergens have been associated. For agricultural cross contact guidance refer to [Assessing Agricultural Cross Contact](#) which lists commodities which may unexpectedly contain allergens, how to assess the risk if allergens are present and guidance on sampling and analysis.

Thank you to the FBOs, comprising of processors, manufacturers, traders, and retailers who kindly shared their allergen-investigation expertise. FBOs who wish to suggest the addition of a food are invited to contact the Allergen Bureau: info@allergenbureau.net.

In this Guide, 'allergens' are the foods that require mandatory declaration as described in the Code.

1.2 Scope

This Guide is relevant to all areas of the food industry, including but not limited to:

- growers
- primary producers
- food ingredient manufacturers, importers, and suppliers - both local and imported
- FBOs of packaged food for bulk sale including business to business
- FBOs of packaged retail ready foods
- FBOs in food service and hospitality
- importers of packaged foods.

2. UNEXPECTED ALLERGENS IN FOOD

Food allergens can be present in ingredients and raw materials in ways that are not immediately obvious. As described in the introduction, the ingredient name alone may not be an indicator of the allergens present. In addition to this, some ingredients may be sourced from suppliers who have limited understanding, or different interpretations, of the Australian and New Zealand allergen declaration requirements, noting that these requirements (although similar) are not the same as other international allergen regulations.

All FBOs who sell foods and ingredients within Australia and New Zealand are encouraged to refer to the *Food Industry Guide to Allergen Management and Labelling for Australia and New Zealand* which is co-written by Allergen Bureau and the Australian Food and Grocery Council (AFGC) and is freely available on both websites. This document describes industry best practice guidance for the management of allergens, allergen labelling, and allergen communication. It also outlines the Australia and New Zealand regulatory requirements for allergen declaration, briefly discusses international food allergen regulation and explains how foods that are imported into Australia and New Zealand must comply with the Code.

2.1 Food and food additives

Table 1 is a guide to assist FBOs with identifying allergens that may occur in ingredients, additives, and processing aids. A robust vendor assurance program should include the questions in this table and ensure that they have been addressed and the outcomes recorded for each relevant ingredient. Refer to the section on Raw Material Specification Assessment in the Allergen Bureau's Allergen Risk Review website (info.allergenbureau.net) for further information.

Although a wide variety of resources have been used in the preparation of this table, it is not a comprehensive list. Many additives and ingredients, even when appearing similar, can be produced at different manufacturing sites, and from a range of raw materials from various sources. It is important to check all information from suppliers carefully and obtain clarification where allergen information is unclear or incomplete. It is not sufficient to simply assume that the allergen information provided by an ingredient supplier is complete - clarification of information is important to prevent any omissions or misunderstandings and demonstrate due diligence.



Table 1: Unexpected allergens associated with foods and ingredients

Food	Details
Acidity regulator – lactate (326, 327, 328, 329)	What is it derived from (e.g. lactic acid (milk) or whey (milk), pork, etc.)?
Acidity regulator – lactic acid (270)	What is it derived from (e.g. milk , tomatoes, molasses, potato, maize starch, wheat starch)?
Albumin / albumen	What is it derived from (e.g. egg , milk etc.)?
Amylase (alpha & beta)	What is it derived from (e.g. pig, wheat , barley , soy etc.)?
Antioxidants	What are they derived from (e.g. soy , egg)?
Baking powder / bicarbonate of soda	Does this contain any carriers or bases or anti-caking agents (e.g. wheat flour, rice flour etc.)? Is the line shared with other foods (e.g. milk)?
Banana chips	What oil was used in the preparation of this product? Peanut oil has been reported to have been used. Refer to section on Fat / Oil.
Beta-carotene	Does it contain tocopherols and what are they derived from (e.g. soy)? Refer to section on Tocopherols. Is it microencapsulated? If so, what is the capsule/coating derived from (e.g. fish)?
Beta-galactosidase	Does it contain milk ?
Beverage whitener	Does it contain wheat , soy , casein (milk) etc.?
Binders	Do they contain milk , egg , cereals containing gluten ?
Bran / cereal brans	Is it a product of / does it contain (wheat , oats , rye , barley , spelt)? Refer to Assessing Agricultural Cross Contact . Is the line shared with other foods (e.g. lupin , soy , other cereals containing gluten)?
Breadcrumbs	Do they contain sesame seeds? Are all possible bread sources considered (i.e. this is often a 'rework' product)? Other bread sources can contain lupin , soy etc. in addition to a range of cereals. Is the bread used for the breadcrumbs glazed with milk or egg ?
Brine	Check for allergens (e.g. casein (milk)).
Caramel	What is it derived from (e.g. wheat , maize, sugar beet, cane sugar etc.)?

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Food	Details
Carotenoids	Are they microencapsulated? If so, what is the capsule/coating derived from (e.g. fish, crustacea)?
Cereals	Is it a product of / does it contain wheat, oats, rye, barley, spelt , including hybridised strains? Refer to Assessing Agricultural Cross Contact .
Cheese	Does it contain rennet (refer to section on Rennet), vinegar (refer to section on Vinegar), gelatine (refer to section on Gelatine), lysozymes (refer to section on Lysozymes), starch (e.g. Edam & Gouda cheese) (refer to section on Starch)?
Cheese (grated)	Does it contain anti-caking agent? If yes, what is it and what is it derived from (e.g. wheat starch, wheat flour, maize etc.)? Refer to section on Cheese.
Cheese powder	Does it contain anti-caking agent? If yes, what is it and what is it derived from (e.g. wheat starch, wheat flour, maize etc.)? Refer to section on Cheese.
Clarifying agents (used in wine, wine vinegar, fruit and vegetable juices, animal/vegetable stock/broth)	Clarifying agents can include casein (milk), egg white, isinglass (fish), gelatine (refer to section on Gelatine) or chitosan (sourced from crustacea).
Cocoa powder	Does it contain soy lecithin or wheat flour?
Coconut / desiccated coconut	Does it contain added sulphites ?
Coconut milk / coconut milk powder	Does it contain milk components such as casein? Is the processing line shared with other foods (e.g. milk)?
Colour(s)	Is there a carrier? If yes, what is the carrier derived from? Does it contain maltodextrin (refer to section on Maltodextrin), starch (refer to section on Starch), Yeast/yeast extract (refer section on yeast), soy , cereals containing gluten ? Check for the addition of sulphites .
Colour (101) - riboflavin	What is it derived from (e.g. yeast)? Refer to section on Yeast/yeast extract.
Colour (153) - carbon black or brilliant black	Does it contain glucose? Refer to section on Glucose.
Colour (160a) - beta carotene	Is it microencapsulated? If so, what is the capsule/coating derived from (e.g. fish gelatine)?

Table 1: Unexpected allergens associated with foods and ingredients

Food	Details
Colour (161) - xanthophylls	What is it derived from (e.g. animal, egg , egg yolk , crustacea , fish)?
Corn	Does this refer to maize or wheat ? Some countries use the terms "corn" and " wheat " interchangeably.
Cornflour / corn starch	Is this derived from wheat or maize flour?
Cultures	Check for milk .
Curry paste / curry powder	What are the ingredients (including compound ingredients)? Do they contain allergens? Check for possible allergens associated with agricultural co-mingling (not just added allergens). Refer to Assessing Agricultural Cross Contact .
Dates	Do they contain any anti-caking agents (e.g. wheat flour, oat flour etc.)?
Dehydrated / dried products	Do they contain any anti-caking agents (e.g. wheat flour, oat flour etc., vegetable oils)? Could these agents be exposed to wheat or other cereals containing gluten ? Do they contain oils (used as a processing aid)? Refer to section on Fat / Oil. Refer to Assessing Agricultural Cross Contact . Check for sulphites . Are sulphites naturally occurring? Are sulphites added as processing aids? What levels are the sulphites in finished dehydrated vegetables (e.g. onions, potato, chives, etc.)?
Dextrin / dextrose / maltodextrin	Is this derived from oats or wheat ? Glucose syrups made from wheat starch may be exempt from mandatory declaration. Confirm if the dextrose etc. is exempt. Confirm that all exemption conditions are met.
Emulsifier	What is it derived from (e.g. soy , egg , wheat)?
Emulsifier - calcium stearate / stearic acid (570)	What is it derived from (e.g. peanuts)?
Emulsifier - sodium lactylates / calcium stearoyl lactylate (481)	What is it derived from (e.g. peanuts , milk)?
Enzymes	Do they contain carriers? Is the carrier from a wheat source? What is the fermentation substrate used to grow the enzymes?
Ethanol	What is it derived from (e.g. wheat , whey (milk))? If derived from wheat or milk , is it exempt from mandatory allergen declaration? Confirm that all exemption conditions are met.

Table 1: Unexpected allergens associated with foods and ingredients

Food	Details
Fats / oils (including cold-pressed oils, animal fats and vegetable oils)	<p>Does it contain antioxidants? Refer to section on Antioxidants.</p> <p>Check for the addition of soy tocopherols. Refer to section on Tocopherols.</p> <p>Animal fat/oil - what is it derived from (e.g. ghee (milk))?</p> <p>Vegetable oil- what is the source of the oil (e.g. soy, peanut, sesame, canola, olive, sunflower etc.)? Has it been exposed to other oils manufactured/processed in the same facility (e.g. tree nuts, peanut, sesame)? If soybean oil is present, is it exempt from mandatory allergen declaration? Confirm that all exemption conditions are met.</p> <p>Cold pressed oil, expeller pressed oil, or extruded oil - these oils are not highly refined and may still contain protein. Has the oil been exposed to other cold pressed oils etc., manufactured/processed in the same facility (e.g. tree nuts, peanut, sesame)?</p>
Fatty acids (mono and di-glycerides)	<p>What are they derived from (e.g. soy)?</p>
Flavour enhancers (620, 621, 622, 623,624, 625, 627, 631, 635)	<p>What are they derived from (e.g. meat, sardines (fish), wheat, soy, maize)?</p> <p>If microbial synthesis occurs, what is the source of the nitrogen and carbohydrate (e.g. wheat, soy, maize etc.)?</p>
Flavours	<p>What are they derived from (e.g. wheat, maize, soy, egg, peanut)?</p> <p>Do they contain or are a product of allergens (e.g. milk)?</p> <p>Do they contain any bases, carriers, anti-caking agents? If yes, what are they derived from?</p> <p>Does it contain maltodextrin (refer to section on Maltodextrin), casein (milk), oleoresins (refer to section on Oleoresins), emulsifiers (refer to section on Emulsifiers), oils (refer to section on Fat / Oil)?</p> <p>Do they contain hydrolysed protein? Refer to section on Hydrolysed Proteins.</p> <p>Do they contain yeasts or yeast extracts? Refer to section on Yeast/yeast extract.</p> <p>Do they contain fatty acids (e.g. mono-, di- or triglycerides?) Refer to section on Fatty Acids.</p> <p>Have they been microencapsulated with fish gelatine?</p>
Fruit	<p>Check waxes/coatings applied to fruits for allergens.</p>
Gelatine	<p>What is the gelatine derived from (e.g. isinglass (fish), beef, pork, chicken etc.)?</p> <p>Check for the addition of sulphites.</p>
Gellan gum	<p>What is the carbohydrate source used to grow the gum (e.g. wheat, maize, molasses, cane sugar)? What is the protein source used to grow the gum (e.g. soy, egg)?</p>
Glaze	<p>Does it contain egg or milk?</p>
Glucose / glucose syrup	<p>What is it derived from (e.g. wheat, maize, rice, potato, oats etc.)?</p> <p>Glucose syrups made from wheat starch may be exempt from mandatory declaration. Confirm that all exemption conditions are met.</p>
Glycerine	<p>Check for peanut.</p>

Table 1: Unexpected allergens associated with foods and ingredients

Food	Details
Herb extract(s)	Do they contain any bases, carriers, anti-caking agents (e.g. maltodextrin, flour, oleoresins, emulsifiers)? If yes, what are they derived from (e.g. wheat , maize, soy , egg etc.)?
Herb(s)	Do they contain any bases, carriers, anti-caking agents (e.g. maltodextrin, flour, oleoresins, emulsifiers)? If yes, what are they derived from (e.g. wheat , maize, soy , egg)? Refer to Assessing Agricultural Cross Contact .
Hydrolysed animal protein	What is it derived from? Is it a product of casein or whey (milk), egg , fish ? Note: Hydrolysed allergen proteins may be difficult to detect through analysis and may be allergenic even when not detected.
Hydrolysed vegetable protein	What is it derived from? Is it a product of soy , wheat , maize, peanut , sesame etc.? Note: Hydrolysed allergen proteins may be difficult to detect through analysis and may be allergenic even when not detected.
Icing sugar	Is it 100% pure icing sugar? If not, what else is added (e.g. wheat)?
Isoflavones	Are they derived from soy ?
Lecithin	What is it derived from? Is it a product of soy , egg etc.? Note: In some countries, certain soy lecithin products may be exempt from allergen declaration. Check the Code carefully to determine the declaration requirements in Australia and New Zealand.
Lysosyme	What is it derived from? Is it a product of egg ? If checking for the presence of egg protein, ensure appropriate test method is used (such as the lysozyme ELISA method).
Malt / malt extract	What is it derived from (e.g. cereals containing gluten such as wheat , barley)?
Maltodextrin	Check for wheat and added sulphites . Glucose syrups made from wheat starch may be exempt from mandatory declaration. Confirm if the maltodextrin is exempt. Confirm that all exemption conditions are met.
Mayonnaise	What are the ingredients (including compound ingredients)? Do they contain allergens (e.g. egg , milk , soy)?

Table 1: Unexpected allergens associated with foods and ingredients

Food	Details
Meat (including manufactured - fish, meat, poultry, smallgoods)	<p>Does it contain binders? If yes, do the binders contain milk, egg, cereals containing gluten?</p> <p>Does this product contain fillers? If yes, do the fillers contain soy, cereals containing gluten?</p> <p>Does it contain cure/brine premixes, or massage mixes? If yes, do they contain milk, egg?</p> <p>Does it contain seasoning premixes? If yes, do they contain wheat, egg, milk, soy?</p> <p>Refer to sections on Herb(s), Spice(s) and their extracts.</p> <p>Does it contain processing aids such as lactoperoxidase (milk)?</p> <p>Does it contain sulphites?</p>
Milk powder	Does it contain soy lecithin?
Minerals	Are they microencapsulated with fish gelatine?
Mustard	Does it contain wheat ? Refer to Assessing Agricultural Cross Contact .
Non-dairy creamers	Milk derivatives have been reported in some non-dairy creamers.
Oleoresins	Do they contain antioxidants/tocopherols or emulsifier? If yes, what are they derived from (e.g. soy, egg, sesame)? Refer to section on Tocopherols.
Omega 3, 6	Are they derived from fish , linseed etc.? Check for the addition of soy lecithin.
Polyols (sugar alcohols) e.g. sorbitol (420)	<p>What are they derived from (wheat, milk, tree nuts, maize etc.)?</p> <p>Some polyols such as sorbitol can be a product of glucose syrup derived from wheat starch, which may be exempt from mandatory declaration. Confirm that all exemption conditions are met.</p>
Processing aids	Are there any processing aids derived from allergen sources?
Rennet	What is it derived from (e.g. bovine or synthetic)? If synthetic, what is the source (e.g. maize, wheat, soy , molasses, sugar beet)?
Rice flour	Does it contain wheat or other allergens from other plant sources (soy, lupin etc.)?
Seasoning pre-mixes	Do they contain wheat, egg, milk, soy ? Refer to sections on Herb(s), Spice(s) and their extracts.
Shortening powder	Does it contain wheat , maize, casein (milk) etc.?

Table 1: Unexpected allergens associated with foods and ingredients

Food	Details
Soy Sauce	Does it contain wheat (in addition to soy)?
Spice extract(s)	Do they contain any bases, carriers, anti-caking agents (e.g. maltodextrin, flour, oleoresins, emulsifiers)? If yes, what are they derived from (e.g. wheat , maize, soy , egg etc.)?
Spice(s)	Do they contain any bases, carriers, anti-caking agents (e.g. maltodextrin, flour, oleoresins, emulsifiers)? If yes, what are they derived from (e.g. wheat , maize, soy , egg)? Refer to Assessing Agricultural Cross Contact .
Stabilisers	What are they derived from (e.g. soy , egg , cereals containing gluten)?
Starch (including native or chemically or physically modified)	What is the starch derived from (maize, tapioca, potato, wheat)? Check for added sulphites .
Sterols (plant)	What is it derived from (soy)? For soybean derivatives that are phytosterols, confirm if allergen labelling exemptions apply.
Suet	Check for cereals containing gluten .
Sugar	What is it derived from (e.g. cane sugar, sugar beet, wheat)?
Sulphites – sulphur dioxide, bisulphite, metabisulphite (220, 221, 222, 223, 224, 228)	What is the concentration of added sulphites ? Check level of addition (mg/kg (ppm) or mg/100g)?
Sultanas	Check for soy oil. Check for wheat starch used as an anti-caking agent.
Textured vegetable protein	Does it contain wheat , soy ?
Thickener	What is the thickener derived from (maize, tapioca, potato, wheat) and what is the carrier material?
Tocopherols	What are the tocopherols derived from (wheat , soy)? For soybean derivatives that are tocopherols, confirm if allergen labelling exemptions apply.
Triticale	Is this a wheat and rye hybrid? Refer to Assessing Agricultural Cross Contact .
Vegetable Oil	Refer to section on Fats / oils (including cold-pressed oils, animal fats and vegetable oils).

Table 1: Unexpected allergens associated with foods and ingredients

Food	Details
Vinegar	What is the vinegar derived from (e.g. wheat, barley , maize, malt, milk)? If balsamic vinegar, does it contain caramel? Refer to section on Caramel. For vinegars derived from alcohol distilled from whey (milk) or wheat - confirm if allergen labelling exemptions apply.
Vitamin E	Check for soy . Refer to section on Tocopherols.
Vitamins / vitamin premix	Are they microencapsulated with fish gelatine? If spraydried, confirm the medium (e.g. maltodextrin). Check for lactose (milk) carriers.
Whitener	Does it contain wheat , casein (milk)?
Wine / wine vinegar	For wines and wine vinegars, are clarifying/fining agents used during the processing of wine (e.g. casein (milk), egg white, isinglass (fish), gelatine (beef, fish , chicken, pork) or chitosan (sourced from crustacea)? If isinglass is used as a clarifying agent, confirm if allergen labelling exemptions apply. Check for sulphites .
Worcestershire sauce	Check for the addition of anchovies (fish), soy .
Xanthan gum	What is the carbohydrate source used to grow the gum (e.g. wheat , maize, molasses, cane sugar)? What is the protein source used to grow the gum (e.g. soy, egg)?
Yeast / yeast extract	What is the substrate the yeast is grown on (e.g. wheat , malt, barley, soy etc.)? Where barley and or wheat are used as a substrate - are they malted? Are there any carriers? Refer to section on Flavours.

3. FOOD FRAUD



The unknown presence of allergens that have been deliberately added to foods and ingredients for the purpose of substitution, adulteration, and economic gain, is an increasing global concern. Food fraud is illegal, and the unknown addition of allergens can affect the safety of consumers with food allergy.

Food adulteration has occurred for hundreds of years and the reasons vary. Examples include: -

- to increase profit by using inexpensive bulking agents
- to be competitive within a global market
- to meet certain quality specifications
- market driven cost cutting
- natural disasters impacting upon supply and demand

Complex supply chains and in many cases a lack of traceability, can mean that it is difficult to address food fraud through appropriate food safety and food defense strategies. It is important for FBOs to take measures to be protected against adulteration and food fraud. FBOs need to ensure they have conducted appropriate risk reviews of their supply chain (including ingredients and suppliers),

identified vulnerabilities, and implemented appropriate preventive measures.

In addition to FBO obtaining information from suppliers to try and understand the complexity in the supply chain and thus, the likelihood a risk may be present, FBO can also consider:

- Is there another ingredient that might look the same? Be the same size? And is cheaper?
- Is there a waste ingredient from another industry that might look the same and be the same size?
- If yes, then could the substitute involved be an allergen?
- Have there been any recalls overseas in ingredient substitution / contamination?

With respect to food allergens, some foods such as wheat flour or by-products, or waste such as peanut and almond shells have been used in food products to enhance their appearance or act as a filler or diluents. [Table 2](#) provides some examples of allergens which have been associated with food adulteration.

Table 2: Examples of allergens associated with food adulteration

Adulterant	Details
Tree nut or peanut shells added to spices	<p>Adulteration of ground spices is an ongoing concern due to the complicated nature of the global spice supply chain and relative ease of hiding an adulterant within the ground material.</p> <p>Hundreds of recalls across Canada and the USA occurred in 2014 when almond and peanut proteins were detected in cumin. Ground peanuts and almond shell waste product are similar in appearance to ground cumin. Further investigation and analysis confirmed peanut protein present in cumin. However, the presence of almond in cumin could not be confirmed due to the discovery that mahleb (a spice made from cherry seeds) was fully cross-reactive with some commercial almond ELISA test kits, showing that identifying allergen adulterants in spices can be complex².</p> <p>Other spices thought to be adulterated with almond and peanut resulting in recalls have been cinnamon, paprika and cayenne pepper.</p>
Starches and cereals added to spices	<p>Spice products such as turmeric, ginger, and paprika have been known to be diluted with starch-based products like cassava, wheat, or barley powder to maintain a consistent colour and meet certain quality standards. Detection of starch addition is difficult without analysis, and some countries may permit the addition of starch to some spices making the discovery of food adulteration even more complicated³.</p>
Tree nut and soy added to oils	<p>Oils such as olive oil, and other vegetable oils can be diluted with a lower cost alternative using hazelnut, soybean, walnut, peanut oils.</p>
Fish substituted for other fish	<p>Valuable species of fish can often be substituted with a lower value fish and falsely labelled. This is cause for concern from an allergen perspective as an individual may be allergic to one type of fish species and not another.</p>
Corn syrup added to honey	<p>Honey has been known to be adulterated with corn syrup. Corn syrup is often a product of maize, however, it can also be a product of wheat.</p>



4. ENDNOTES

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