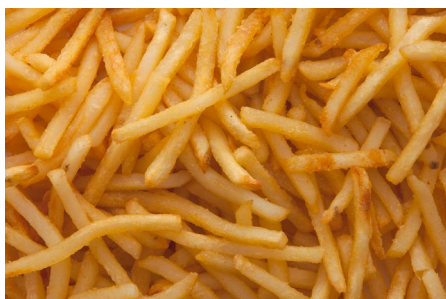


Reducing Acrylamide in Potato-based Foods: Fact Sheet

• Information on acrylamide • Resources for industry • Processing and mitigation tables



Acrylamide is a chemical that can form in some plant-based foods during high-temperature cooking, such as frying, roasting, and baking. Reducing acrylamide levels in foods may reduce potential human health risks from exposure to acrylamide.



What foods is acrylamide found in?

Acrylamide forms primarily in cooked plant-based foods, including:

- **Cereal-grain-based foods** such as cookies, crackers, breakfast cereals, and toasted bread
- **Potato products** such as French fries and potato chips
- **Roasted coffee beans**



How does acrylamide form?

Acrylamide forms in foods from a chemical reaction between asparagine (an amino acid) and reducing sugars (such as glucose and fructose). This reaction is part of the Maillard reaction, which leads to color, flavor, and aroma changes in cooked foods. Acrylamide usually forms at elevated temperatures used when frying or baking (above 120 °C (248 °F)) and in low moisture conditions.

Key points to consider

- Acrylamide can form in some potato-based foods during certain types of high-temperature cooking.
- Acrylamide levels can be affected by raw materials, processing and ingredients, and preparation and cooking instructions on finished foods. For example, decreasing the frying temperature and cooking to a lighter color may help lower acrylamide levels in potato chips.
- FDA's [Acrylamide in Foods Guidance](#) provides information to help growers, manufacturers, and food service operators reduce acrylamide levels. This fact sheet contains information from the guidance on potato-based foods.

What does the FDA guidance recommend?

- Manufacturers should be aware of acrylamide levels in their products.
- Manufacturers should evaluate approaches to acrylamide reduction that may be relevant to their products.
- When evaluating possible approaches to reduce acrylamide, manufacturers should consider the impact on overall chemical and microbiological safety, nutritional quality, and organoleptic properties such as taste and mouth feel.

Resources for Industry

The FDA encourages growers, manufacturers, and food service operators to read the following resources:

Acrylamide in Foods Guidance
www.fda.gov/media/87150/download

FDA Acrylamide Webpage
www.fda.gov/food/chemicals/acrylamide

Hazard Analysis and Risk-Based Preventive Controls for Human Food Draft Guidance, Chapter 3
www.fda.gov/media/99558/download

Processing and Mitigation Tables: Potato-based Foods

Food	Process Step	Steps that may help reduce acrylamide
Potato-based foods	Raw materials	<ul style="list-style-type: none"> • Selecting potato varieties that are low in acrylamide precursors, keeping in mind seasonal variation. • Optimizing potato maturity by controlling planting time, harvest time, and input management, and by removing immature tubers before processing. • Avoiding handling potatoes with excessive roughness, avoiding bruising potatoes, and sorting out or carefully trimming potatoes with defects. • Avoiding cold temperatures during harvest, transport, delivery, and storage. • Managing storage conditions to control sprouting and provide ventilation. • Monitoring reconditioning results and avoiding reconditioning potatoes stored for prolonged periods. • Assessing reducing sugar levels in incoming potatoes, identifying target levels for incoming potatoes, or using treatments to reduce sugar levels.
French fries	Processing and ingredients	<ul style="list-style-type: none"> • Cutting fries in shapes with lower surface area to volume ratio and screening out small fragments. • Changing blanching practices, although such changes may affect product quality. • Using sugar dips to reduce variability, but using reducing sugars such as fructose in dips may increase acrylamide. • Using alternative coloration methods by discouraging overbaking. • Using sodium acid pyrophosphate (SAPP) and evaluating other dip or batter ingredients to determine if they contribute to acrylamide formation during frying.

Processing and Mitigation Tables: Potato-based Foods

Food	Process Step	Steps that may help reduce acrylamide
Sliced potato chips	Processing and ingredients	<ul style="list-style-type: none"> • Increasing peel removal. • Washing or soaking potato chips before frying, but may cause unacceptable changes to the chips. • Cutting thinner potato chip slices. • Decreasing frying temperatures to 175 °C (347 °F) or below and targeting higher moisture endpoints, but it is important to determine if moisture endpoints provide acceptable product quality. • Using lower temperatures during final cooking stages and using techniques like flash frying, vacuum frying, or batch frying. • Sorting by color, by providing a useful indicator of acrylamide levels, especially if correlated with measured levels of acrylamide in specific products.
Fabricated potato chips & snacks	Processing and ingredients	<ul style="list-style-type: none"> • Selecting potato flakes with lower levels of reducing sugars. Lower reducing sugar levels may be found by specifying maximum sugar levels, buying early in the processing season, or by mixing flakes from different sources. Flakes treated with acidulants, calcium, or asparaginase during flake production may also produce flake-based products with lower acrylamide. • Partially substituting potato flakes with other ingredients in fabricated potato products. • Adding calcium salts to potato doughs in fabricated potato products. • Adding acidulants to potato doughs in fabricated potato products. • Adding asparaginase to potato doughs in some fabricated potato products. • Decreasing cooking temperatures, using lower final temperatures in multistage processes, and using higher moisture endpoints in fabricated potato chips.

Processing and Mitigation Tables: Potato-based Foods

Food	Process Step	Steps that may help reduce acrylamide
Potato-based foods (Food service operation)	Preparation and cooking instructions	<ul style="list-style-type: none">• Providing appropriate cooking instructions on frozen french fry packages to guide final preparation by consumers and food service operators.• Educating food service workers to follow proper frying techniques for french fries.• Selecting potato varieties that are low in reducing sugars for frying or roasting, properly handling and storing potatoes, and using certain cooking practices for foods made from potatoes.