ICON FOODS

BUILD HARD CANDY WITHOUT SUGAR

Created Crystal-Clear Confections Using Allulose and Isomalt

# CLARITY, CRACK, AND CONSISTENCY

Hard crack candy has always been defined by its crystal clarity, glossy shine, and iconic snap. Traditionally, sucrose was the only way to achieve that signature look and texture. But today's consumers are demanding something different: the same satisfying candy experience without the high sugar load. By combining allulose and isomalt, formulators can create hard crack candy that delivers classic performance while meeting modern expectations for clean labels, lower calories, and reduced glycemic impact.

Allulose is a naturally occurring rare sugar found in small amounts in foods like figs and wheat. It tastes like sugar and behaves like sugar, yet contributes almost no calories and has a minimal effect on blood glucose. Its browning ability and smooth sweetness make it ideal for confectionery. However, allulose alone doesn't reliably achieve the temperatures required for true hard crack. That's where isomalt, a beet-derived sugar alcohol, becomes essential. Isomalt brings structural strength, excellent clarity, and the stability needed to reach and hold the hard crack stage. Together, the two ingredients create a balanced system: allulose provides flavor and consumer appeal, while isomalt drives the physical properties that make hard candy glossy, durable, and beautifully breakable.

This combined approach allows manufacturers to formulate no-added-sugar hard candies without sacrificing appearance, mouthfeel, or durability. Whether producing lollipops, crystal-clear drops, artisan shards, or classic butterscotch-style pieces, the allulose–isomalt system delivers dependable results with clean-label benefits consumers recognize and value.

Because hard crack candy is sensitive to temperature, pH, moisture, and agitation, Icon Foods provides detailed guidance to support success at every step. Our formulation expertise helps manufacturers navigate the cooking stages, avoid crystallization, and hit precise target temperatures for consistent cracking, clarity, and flavor release. The result is a confection that feels traditional but fits a modern nutritional profile.

Icon Foods supplies KetoseSweet allulose and Iconimalt isomalt, along with documentation, samples, and one-on-one technical support to help you bring better-for-you hard candies to market. Create products that shine bright, crack cleanly, and satisfy consumers seeking indulgence without compromise. Taste the Icon difference.

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Icon Foods, Inc.
19250 NE Portal Way
Portland, OR 97230
310-455-9876
iconfoods.com

# FAST FACTS

**Allulose delivers clean sweetness with almost zero calories** This rare sugar tastes and performs like sucrose but has a negligible impact on blood glucose, making it ideal for better-for-you hard candy formulations.

**Isomalt is essential for achieving true hard crack** Derived from beet sugar, isomalt provides the structural strength, clarity, and stability required to reach 260–280°F and form the classic glassy snap.

**The allulose–isomalt blend creates crystal-clear candy without added sugar** Together, they build a high-gloss, durable candy matrix that mimics traditional sucrose while supporting clean-label and low-glycemic product claims.

**pH and temperature precision are key to success** Allulose is sensitive to high pH and begins degrading sooner than sucrose, so controlling acidity and monitoring cooking stages ensures consistent crack, texture, and shine.

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# FAQ

1. **How does the molecular behavior of allulose differ from sucrose during thermal processing at hard crack temperatures?**

   **Answer:** Allulose undergoes thermally induced degradation at temperatures significantly lower than sucrose due to its unique stereochemistry as a C-3 epimer of fructose. Its open-chain form is more susceptible to enolization and subsequent Maillard and caramelization pathways, especially under elevated pH. As a result, allulose alone cannot reliably achieve the 149–155°C range required for traditional hard crack candy, necessitating the incorporation of isomalt to provide structural integrity and prevent premature decomposition.

2. **What functional role does isomalt play in stabilizing allulose in hard crack formulations?**

   **Answer:** Isomalt contributes a thermally robust, low-hygroscopic crystalline matrix that supports glass-transition behavior similar to that of sucrose. Its resistance to inversion and caramelization maintains clarity and prevents collapse during cooling. When combined with allulose, isomalt buffers thermal load, allowing the mixture to reach hard crack temperatures (127–138°C in an acidified environment) without viscosity instability or browning artifacts. This synergy enables the development of optically clear, high-hardness confections without sucrose.

3. **How does pH modulate the kinetics of allulose degradation?**

   **Answer:** Allulose degradation accelerates under alkaline conditions through base-catalyzed enolization, fragmentation, and formation of low-molecular-weight volatiles. Maintaining an acidified system (e.g., ~pH 3.8) suppresses enediol formation and slows chromophore generation, thereby expanding the thermal processing window. This pH-controlled environment is critical for ensuring consistency of the allulose–isomalt system at elevated temperatures and minimizing variability in color development and final texture.

4. **Why does the allulose–isomalt system produce a different temperature curve than sucrose?**

   **Answer:** The altered thermal behavior arises from differences in molecular weight distribution, water-binding affinity, and glass transition phenomena. Allulose and isomalt exhibit lower boiling-point elevation than sucrose, resulting in modified moisture-loss kinetics and a downward shift in observable candy stages. Consequently, the hard-crack stage occurs at 127–138°C rather than 149–155°C. Understanding these thermophysical deviations is essential for accurate instrumentation calibration and process control.

5. **How does the allulose–isomalt matrix influence long-term stability and shelf life of hard crack candy?**

   **Answer:** The system exhibits reduced hygroscopicity relative to sucrose-based confections, improving resistance to moisture uptake and surface stickiness. Isomalt's crystalline stability mitigates recrystallization, while allulose provides a modest humectant effect that helps maintain structural resilience without promoting bloom. Properly balanced, the matrix yields a stable amorphous solid with slower water diffusion, superior clarity retention, and an extended shelf life even in fluctuating humidity.

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