WORLD SALT SYMPOSIUM

June 19-21, 2018 Park City UT, USA

Next Generation Anti-caking Agent for Edible Salt

Iron Tartrate

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AkzoNobel

SPECIALTY CHEMICALS

Global chemical company

> 9,000 people

€ 5 billion revenue

Major salt producer since 1918

ONE GRAIN® KNZ® BROXO MATIC Sanal® Suprasel®

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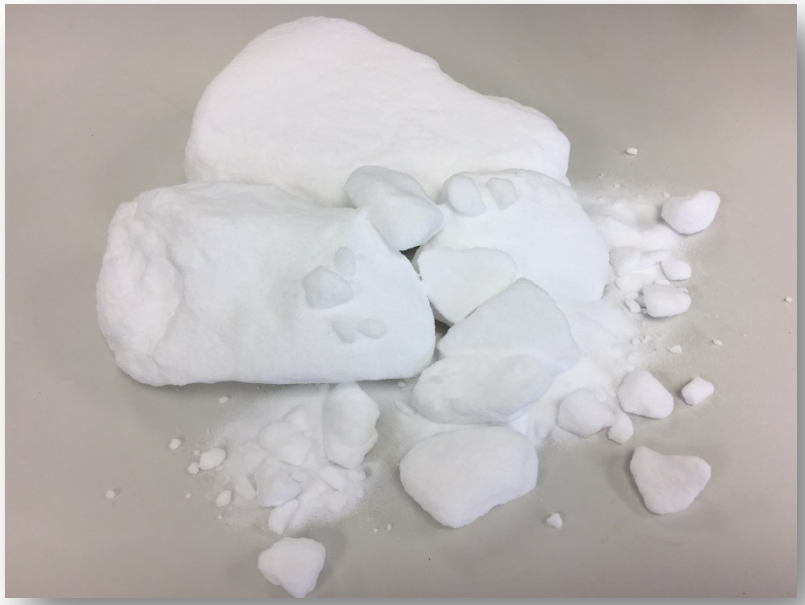
Sustainability core value of AkzoNobel

AkzoNobel
number 1 – Dow Jones Sustainability Index 2012, 2013, 2014, 2015, 2017

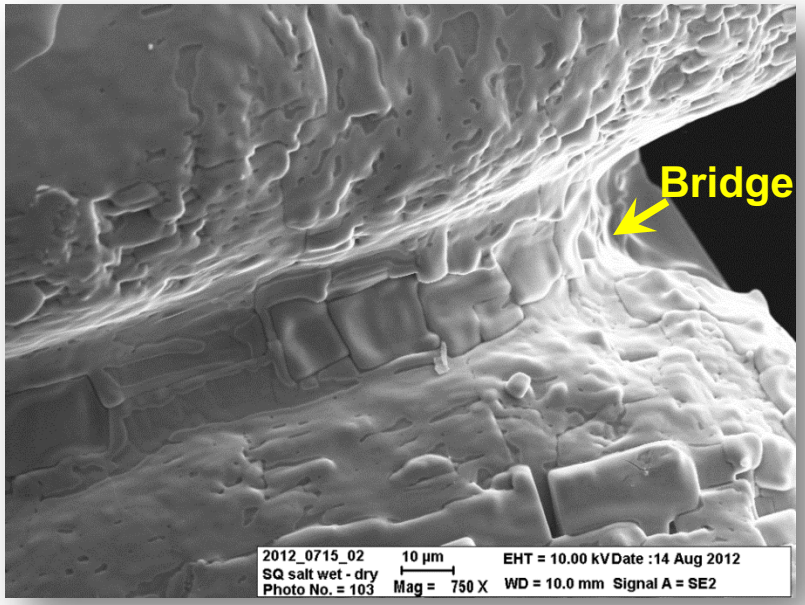
AkzoNobel ambition
20% eco-premium solutions
25 – 30% reduce Carbon emissions

Planet Possible™

Salt caking



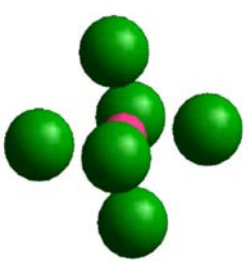
Handling difficulty



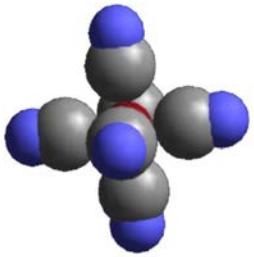
Crystal bridge via dissolution & recrystallization

Traditional anti-caking agent

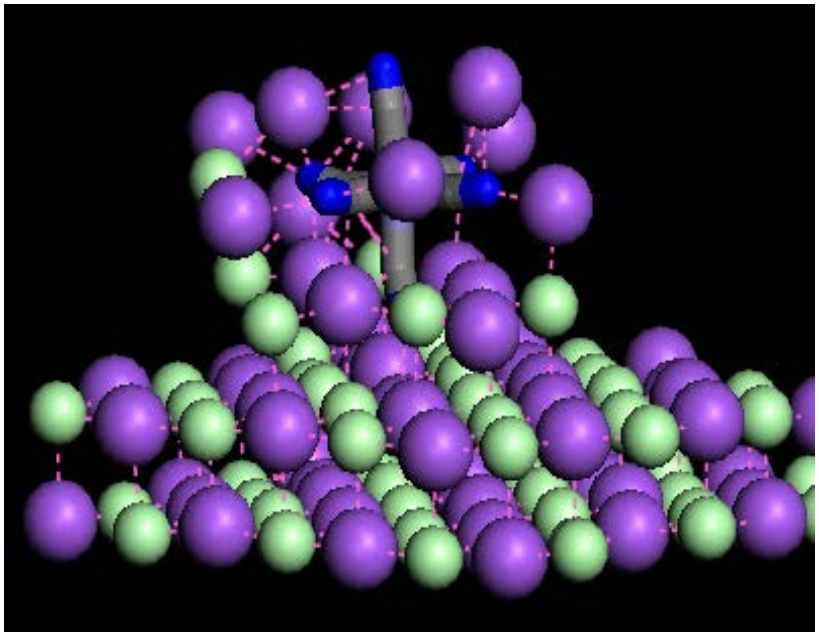
- **Solution:** applying anti-caking agents
- **YPS ($Fe(CN)_6^{4-}$):**
  - ✓ Patented by AkzoNobel (1953)
  - ✓ Worldwide standard



$NaCl_6^{5-}$



$Fe(CN)_6^{4-}$



YPS complex builds into NaCl grid

Molecular dynamics simulation

YPS = Yellow prussiate of soda

Driving force for next generation anti-caking agent

Growing demand natural & bio-based food additives

Innovation at the heart of everything we do

Preparing for **the future** → Next generation

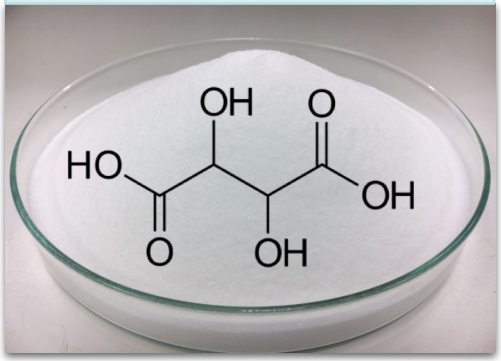
Key criteria:

- Natural / bio-based material
- Strong anti-caking at ppm level
- Easy to apply in practice

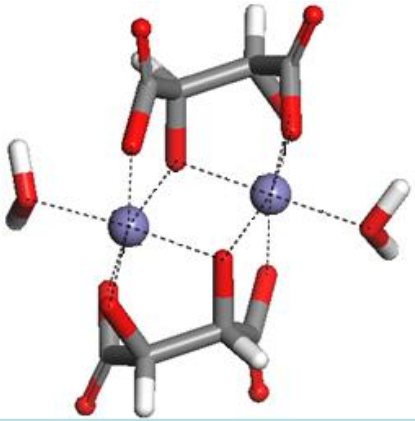
Next generation anti-caking → Iron tartrate

Grape

L-tartaric acid



Patented

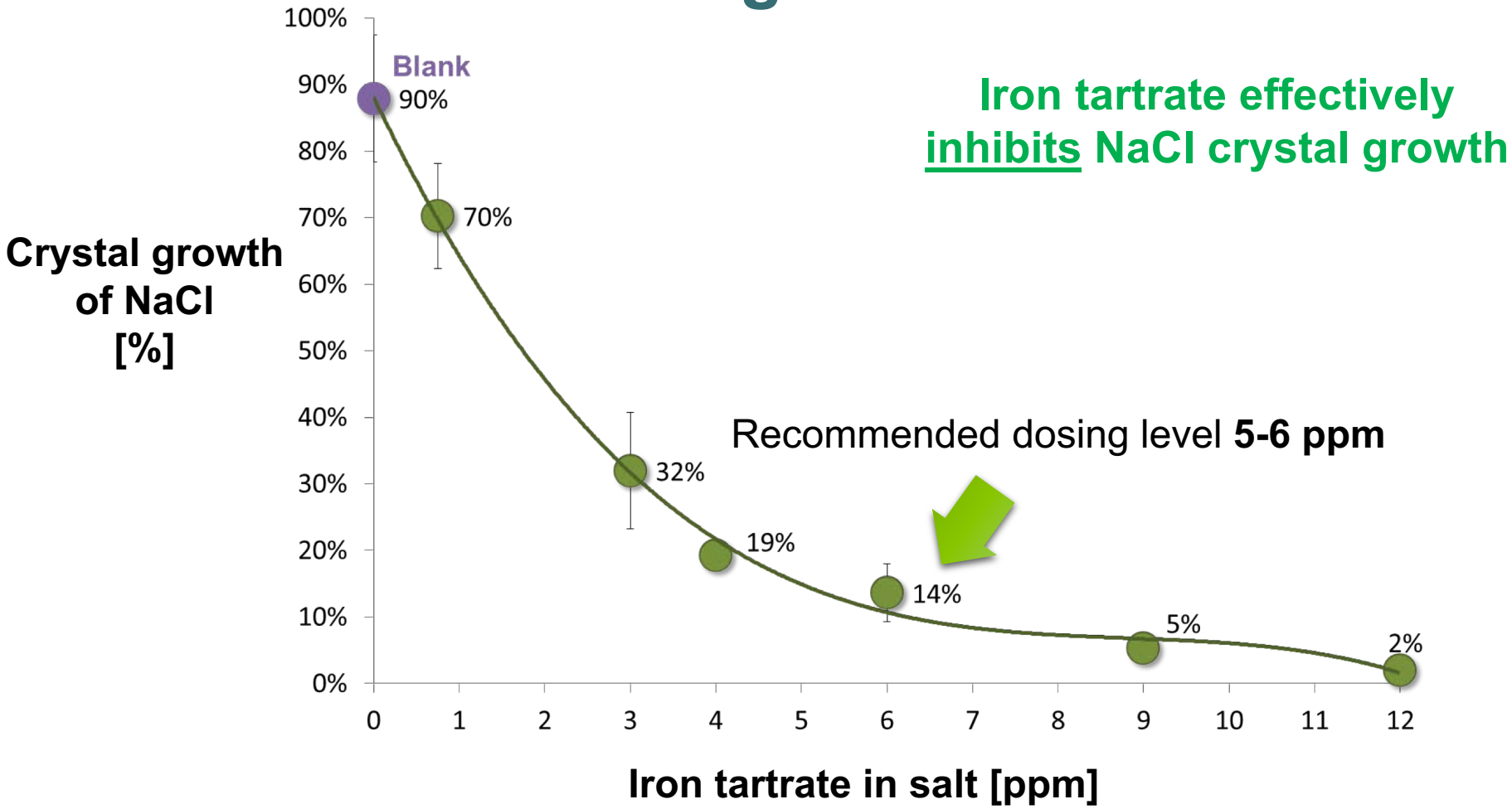


Iron tartrate complex

meso-tartrate
D-tartrate
L-tartrate
Fe

Iron tartrate

Anticaking mechanism



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Long-term storage test: Flowability

1: Excellent
2: Very good
3: Good
4: Acceptable
5: Below standard

Iron tartrate is the next generation anti-caking agent.

Salt type	Package type	3 months	6 months	12 months	18 months	24 months
Salt + 5 ppm iron tartrate	Bag	1	1	1	2	2
	Box	1	1	3	3	3
Iodized salt (KI) + 5 ppm iron tartrate	Bag	1	1	2	1	1
	Box	1	1	1	1	1

Approvals for use in edible salt

United States	FDA_GRAS	2015	GRN 532
Europe	EFSA	2015	E534
China	National Health Commission	2016	Included in Chinese Standards for Food Additives GB2760

- Iron tartrate for use as anti-caking agent in edible salt.
- Dosing level ≤ 12 ppm calculated as Fe.

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Iron tartrate
next generation anti-caking agent

Bio-based material

Cyanide free

Effective anti-caking

Iron tartrate edible salt

Easy to apply

For further information, please contact us: Irontartrate@AkzoNobel.com


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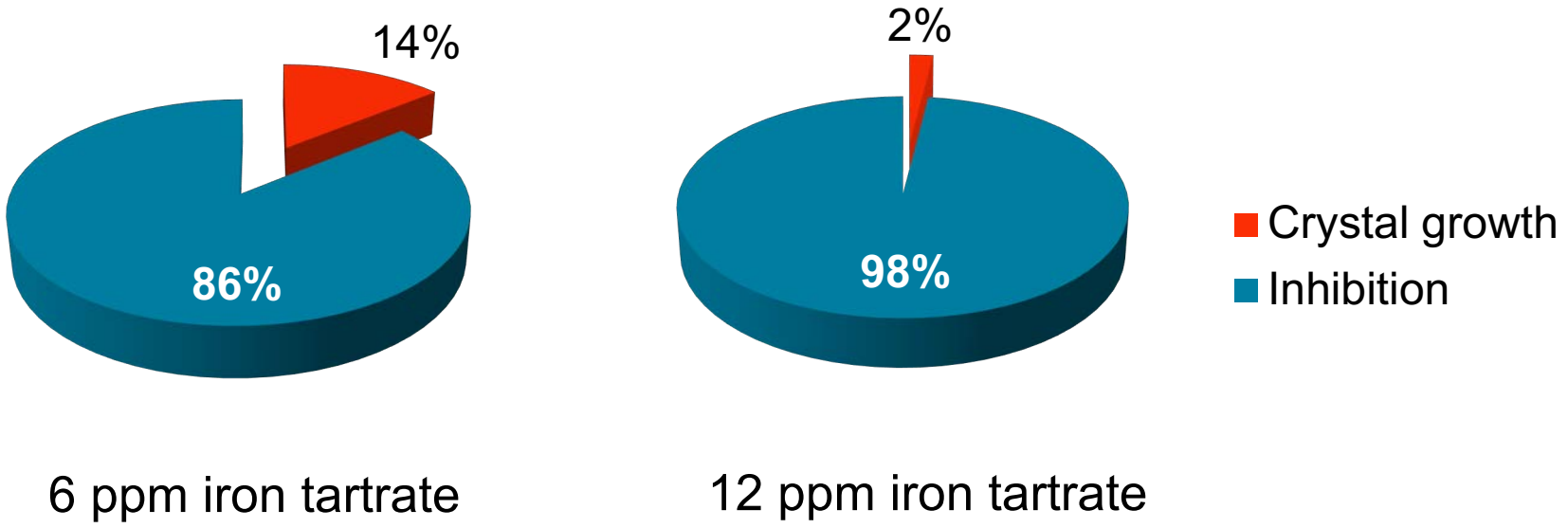
Anticaking mechanism

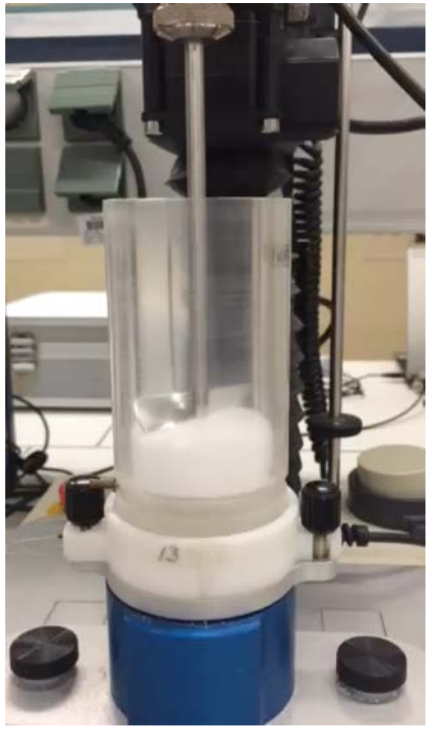
Iron tartrate effectively inhibits NaCl crystal growth



6 ppm iron tartrate

12 ppm iron tartrate

Iron tartrate prevents salt caking



Powder flow analyzer