Superfruit for Food Applications

Acerola

Natural source of vitamin C

ORGANIC

CLEAN LABEL

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More than 120 years of experience in Africa

World leader in acacia gum (40% market share)

Specialist of botanical extracts and functional ingredients

Committed to a sustainable approach

World leader in natural Ingredients

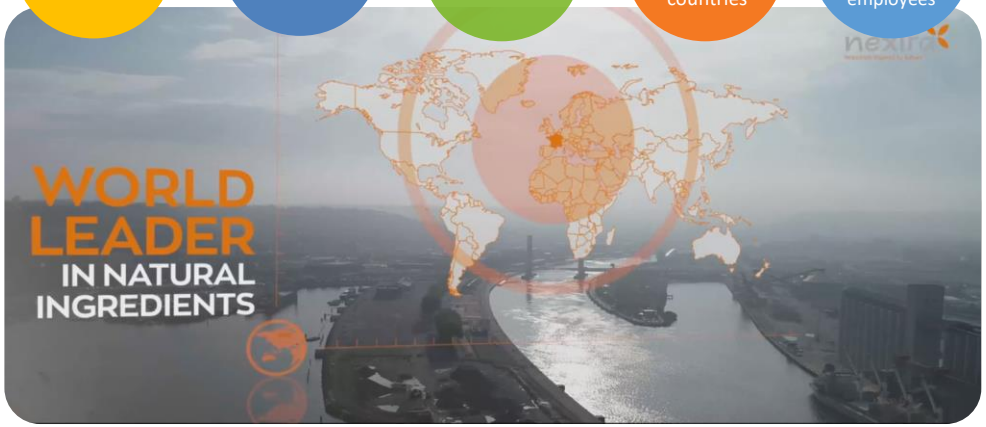
8 Companies

8 Production Units

5 Continents

80 Covered countries

More than 270 employees



Companies:
Nexira, Starlight, Afritec, USA, Mexico, Brazil, India, Japan

Production Units:
France: Serqueux, Rouen, Bram, Corbie, Lamothe
International: Tunisia, Sudan, Chad

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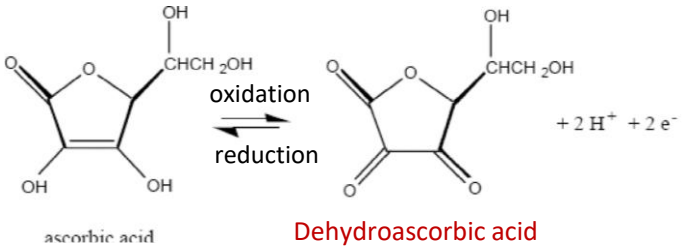
Acerola: a wonderful superfruit

Naturally source of vitamins

- Origin: **Brazil**
- Acerola is **particularly rich in vitamin C**

There is 40 to 100 times more vitamin C in a glass of acerola juice than in a glass of orange juice

- Other compounds: **vitamin A, vitamin B carotenoids, bioflavonoids**



ascorbic acid — Dehydroascorbic acid

Vitamin C = ascorbic acid = **powerful reducing agent**
It can react with oxygen and become an oxidized form, named “dehydroascorbic acid”
→ **It prevents other compounds from oxidation**

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Acerola: a wonderful superfruit

Market & applications

VITAMIN C FOR NUTRITIONAL ENRICHMENT

VITAMIN C FOR FOOD PROTECTION

High content in vit. C of Acerola Extract

Beverage: acerola juice

Food supplements: dry acerola extracts

Snacks: bars

Cereals

Confectionery: candy, snack

Bakery : soft bread, brioche, industrial pastries…

Meat: steak, sausage, salami, chorizo, delicatessen

Fruit preparation: puree, snack, multifruit juice

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Acerola: a wonderful superfruit

Nexira's range of Acerola Extracts

Origin	Brazil
Latin name	*Malpighia glabra L.* (syn. *Malpighia punicifolia* L.)
Process	Water extraction & spray-drying (powder)
Content	Native acerola 17 % organic Native acerola 17%, 36%, Natural acerola 17%, 25%, 50%
Raw material	Juice, fruit puree
Health benefits	Superfruit, Energy, Vitality, Immunity
Food interests	Technological properties
Labeling	« Acerola extract » or « [Functionality]: acerola extract (ascorbic acid) »

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Acerola in bakery

Harrys Longue Conservation Petites Tranches Nature: Natural Long Shelf Life Sliced Bread

France, Feb 2019

DESCRIPTION Natural long shelf life sliced bread in a plastic packet.

VIEW DETAILS

L Angelus Boulangerie Bio Pain De Mie Nature: Plain Sandwhich Bread

France, Feb 2019

DESCRIPTION Natural sliced plain bread in a paper tray, held in a plastic packet.

VIEW DETAILS

Rewe Bio Dinkel Krustenspitz: Spelt Bread Buns

Germany, Dec 2018

DESCRIPTION Organic ready made spelt bread buns in a plastic tray.

VIEW DETAILS

Bio Bio Weizenbrotchen Farmerkrusti: Organic Wheat Bun

Germany, Dec 2018

DESCRIPTION Partially baked organic wheat bun in a plastic tray.

VIEW DETAILS

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Acerola in bakery

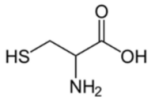
Vitamin C as dough conditioner

Oxidation happens during kneading with O_2 incorporation and can be accelerated with ascorbic acid addition (acerola extract)

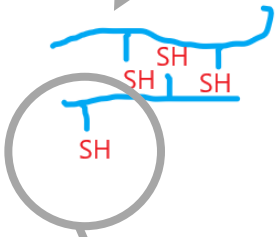
Kneading

Gluten

Gluten proteins contain reactive thiol groups (SH)

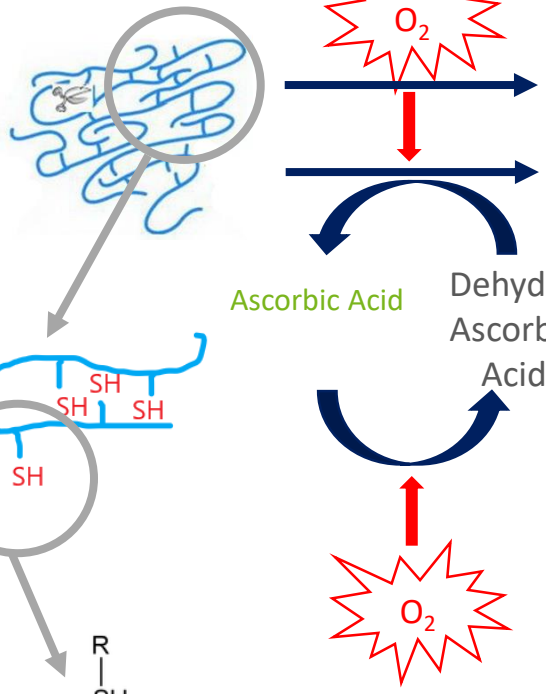


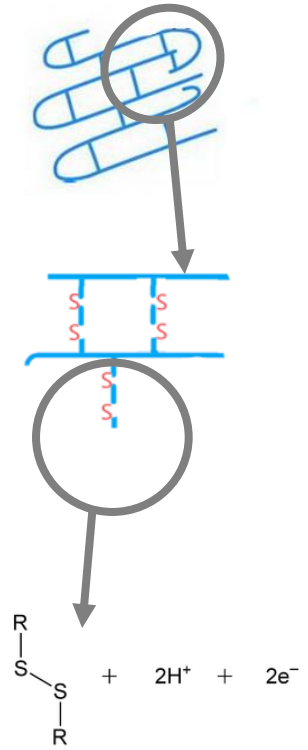
Cysteine



Kneading unfolds and aligns proteins into strands

Kneading brings water & **O_2**





Disulfur crosslinks are formed by oxidation of gluten thiol groups

They increase size of gluten proteins

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Acerola in bakery

Vitamin C as dough conditioner

Acerola extract addition (ascorbic acid):

- Enhances dough's resistance
- Improves crumb's structure
- Reduces kneading time
- Improves elasticity & strength
- Extends shelf-life
- Facilitates the industrial process

Recommended use level: 50 to 150 ppm acid ascorbic
(0.0050% to 0.015% acid ascorbic)

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Acerola in meat

Madrange Le Gourmet Label Rouge: Red Label Ham

France, Jan 2019

DESCRIPTION Rindless and deffatted high quality cooked ham in a 160g plastic tray.

VIEW DETAILS

Auchan Schab Wieprzowy Parzony: Parboiled Pork Loin

Poland, Jan 2019

DESCRIPTION Smoked, steamed and chopped pork tenderloin in a plastic tray.

VIEW DETAILS

Delpeyrat Extra Tendre Aiguillettes De Canard Assaisonnees A La Fleur De Sel: Duck Aiguillettes Seasoned With Fleur De Sel

France, Dec 2018

DESCRIPTION Duck aiguillettes seasoned with fleur de sel, in a 290g vacuumed plastic tray held in a plastic wrapper.

VIEW DETAILS

Ja Natuerlich Putenfrankfurter: Turkey Frankfurter

Austria, Dec 2018

DESCRIPTION Turkey frankfurter sausages in a 220g vacuumed plastic packet.

VIEW DETAILS

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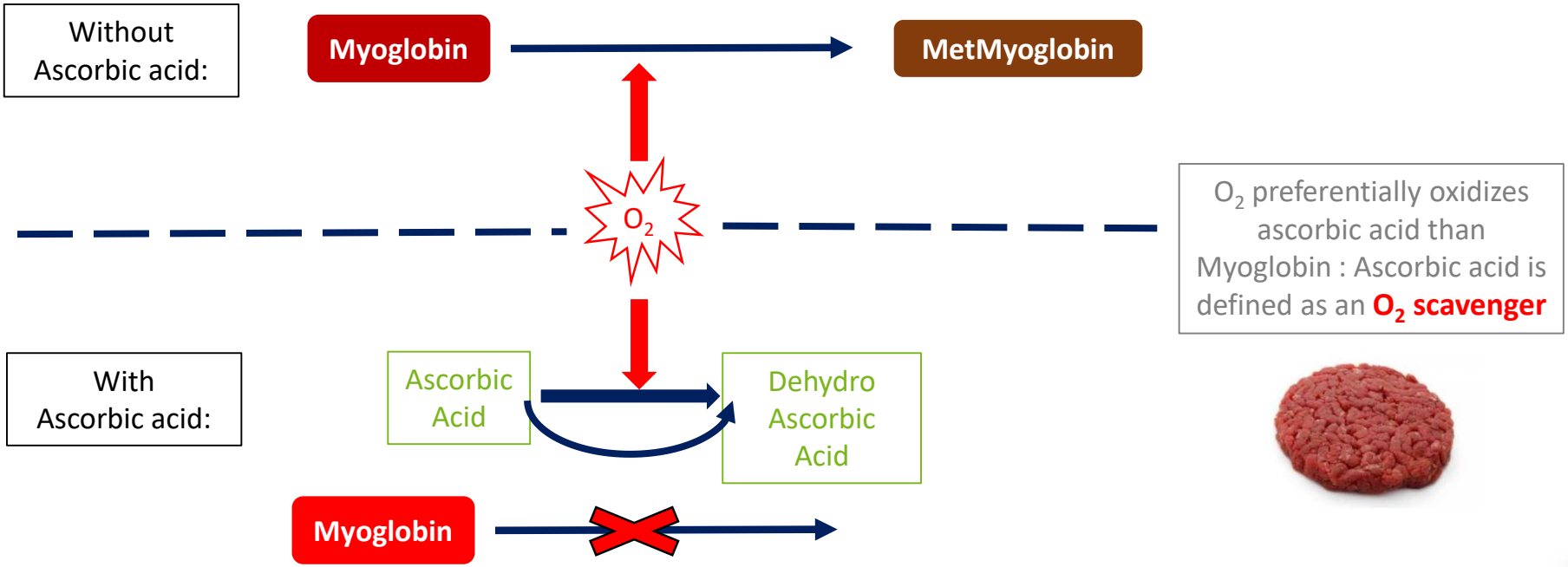
Acerola in meat

Raw meat

Acerola can improve color stability in meat as it helps to stabilize meat protein (Myoglobin) and its color.

In raw meat (without nitrites):

Ascorbic acid's antioxidant action prevents the red Myoglobin from oxidizing to MetMyoglobin, which has a brown color.



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Acerola in meat

Raw meat

- Acid ascorbic is efficient on steak color preservation between 0.030% and 0.1%
- Excess might induce alteration of proteins (with acidification)

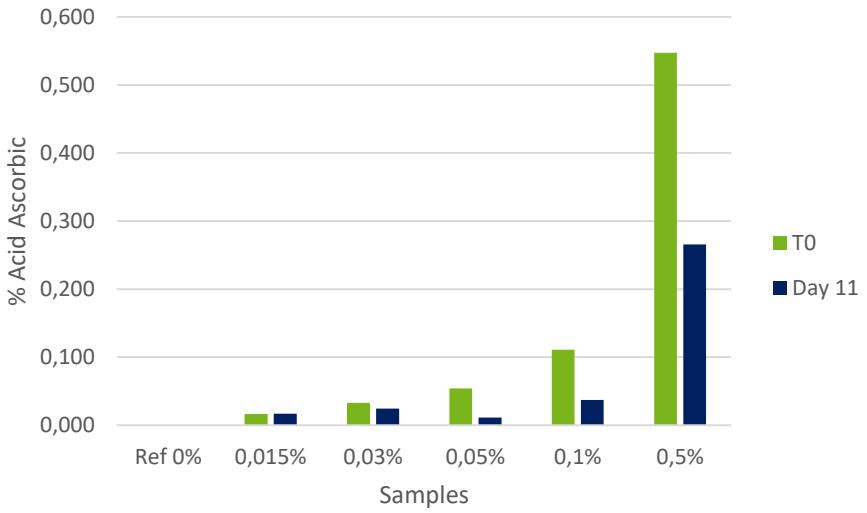
Laboratory tests with addition of ascorbic acid from Native Acerola 17% on steaks

T0

Day 11

Preservation in the fridge 4°C, dark conditions.
Acid ascorbic equivalent percentage.

Residual acid ascorbic concentration



Note: 0.030% ascorbic acid corresponds to 176mg of 17% Native Acerola Extract in 100g steak

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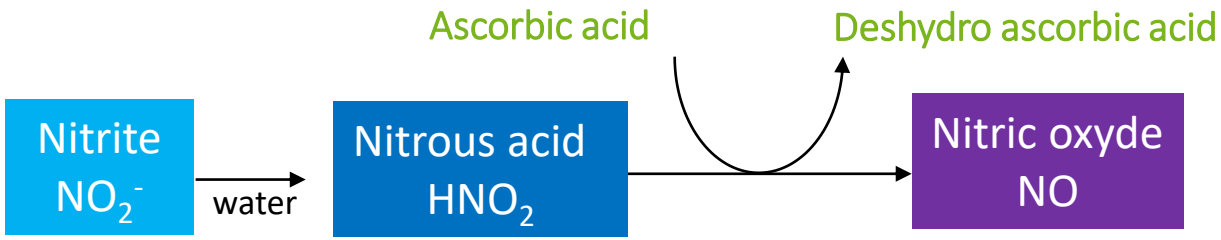
Acerola in meat

Cured meat

In cured meat (after nitrite addition): Ascorbic acid can also improve color stability and will step two times:

A) Nitric oxide production : **Ascorbic acid** will promote nitric oxide production from nitrite

- Nitrite will react with water to form nitrous acid
- At the same time, ascorbic acid will :
  - Oxide the nitrous acid into nitric oxide necessary to stabilize the color of cured meat
  - Avoid/limit possible reaction of nitrous acid to form nitrosamine



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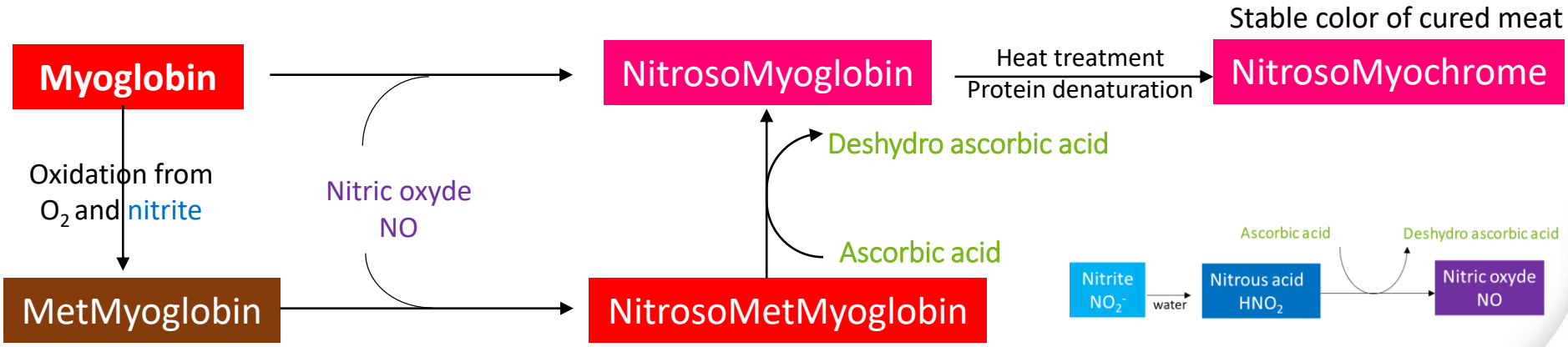
Acerola in meat

Cured meat

In cured meat (after nitrite addition): Ascorbic acid can also improve color stability and will step two times:

B) Stable pink color precursor formation (NitrosoMyoglobin)

- Myoglobin will react with NO to form NitrosoMyoglobin
- Myoglobin can be oxided in MetMyoglobin (brown color)
  - MetMyoglobin will react with NO to form NitrosoMetMyoglobin.
  - NitrosoMetMyoglobin will react with Ascorbic acid to for NitrosoMyoglobin
- NitrosoMyoglobin is then stabilized by heat treatment in Nitrosomyochrome, the stable pink color



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Acerola in fruit preparations

Bonne Maman Compotee Peches And Abricots Delicate Verveine: Peach And Apricot Compote With Delicate Verbena

France, Oct 2018

DESCRIPTION To concoct peach and apricot compote, Bonne Maman chose its fruits with care and added a delicate touch of verbena to ...

VIEW DETAILS

Delecta Fit Aronia Owocowy Kubek Kisiel: Aronia Jelly Mix

Poland, Sep 2018

DESCRIPTION Aronia flavored jelly mix with sugar content reduced by 30%. The taste of Polish fruit was combined with the seeds of ...

VIEW DETAILS

Marinoe Mon Dessert Bio Vegan Banane Baobab: Organic Vegan Banana Baobab Dessert

France, Aug 2018

DESCRIPTION Plant-based dessert based on coconut milk, fair trade banana and baobab. Comes in a plastic tray held in a cardboard ...

VIEW DETAILS

Andros Sans Sucres Ajoutes Pomme Nature: No Added Sugar Apple Dessert

France, Mar 2016

DESCRIPTION Apple dessert with no added sugar, in a glass jar.

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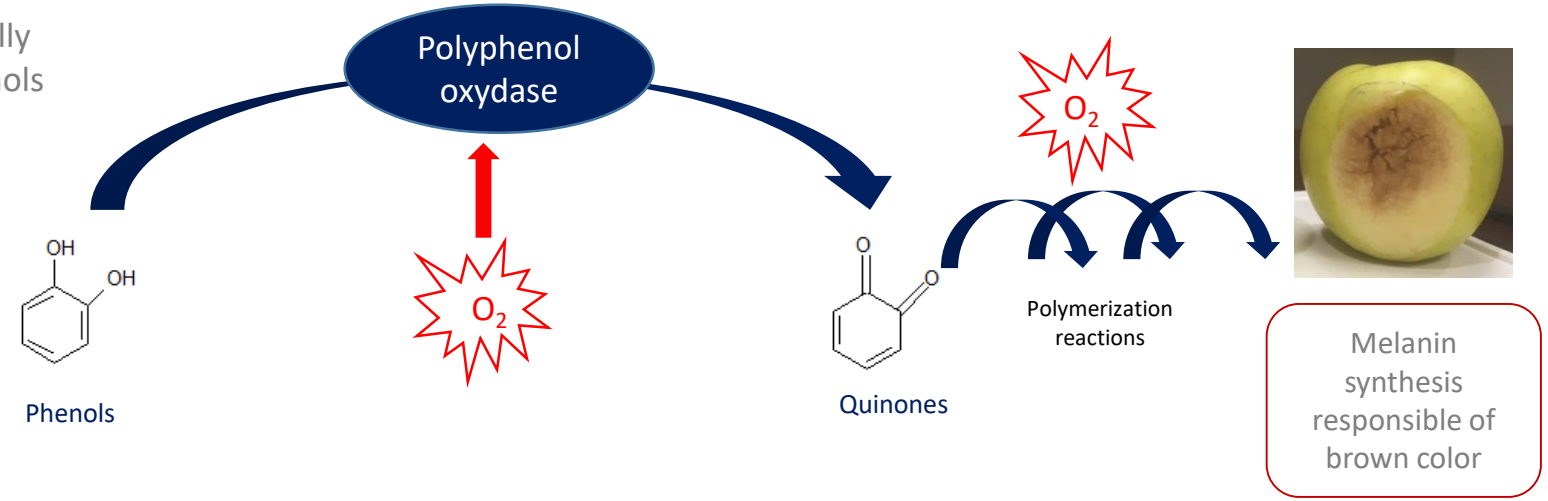
Acerola in fruit preparations

Without ascorbic acid

Fruits naturally contains phenols

Apple fresh cut



In natural conditions, a fruit cut leads to phenol oxidation by [polyphenoloxydase enzyme + O2] to form quinones. With oxygen, quinones are polymerized in brown pigment melanin.

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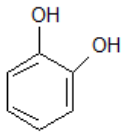
Acerola in fruit preparations

With ascorbic acid addition

Fruits naturally contains phenols

Apple fresh cut



Phenols

Polyphenol oxydase

O_2

Ascorbic Acid

Dehydro Ascorbic Acid

Recommended use level:
300 ppm acid ascorbic (*0.030%)*

As an oxygen scavenger, Ascorbic acid react with O_2 and prevent oxidation of phenols in quinones and melanin. Ascorbic acid therefore delays fruit browning. The shelf-life is extended.

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Thank your

for your attention!

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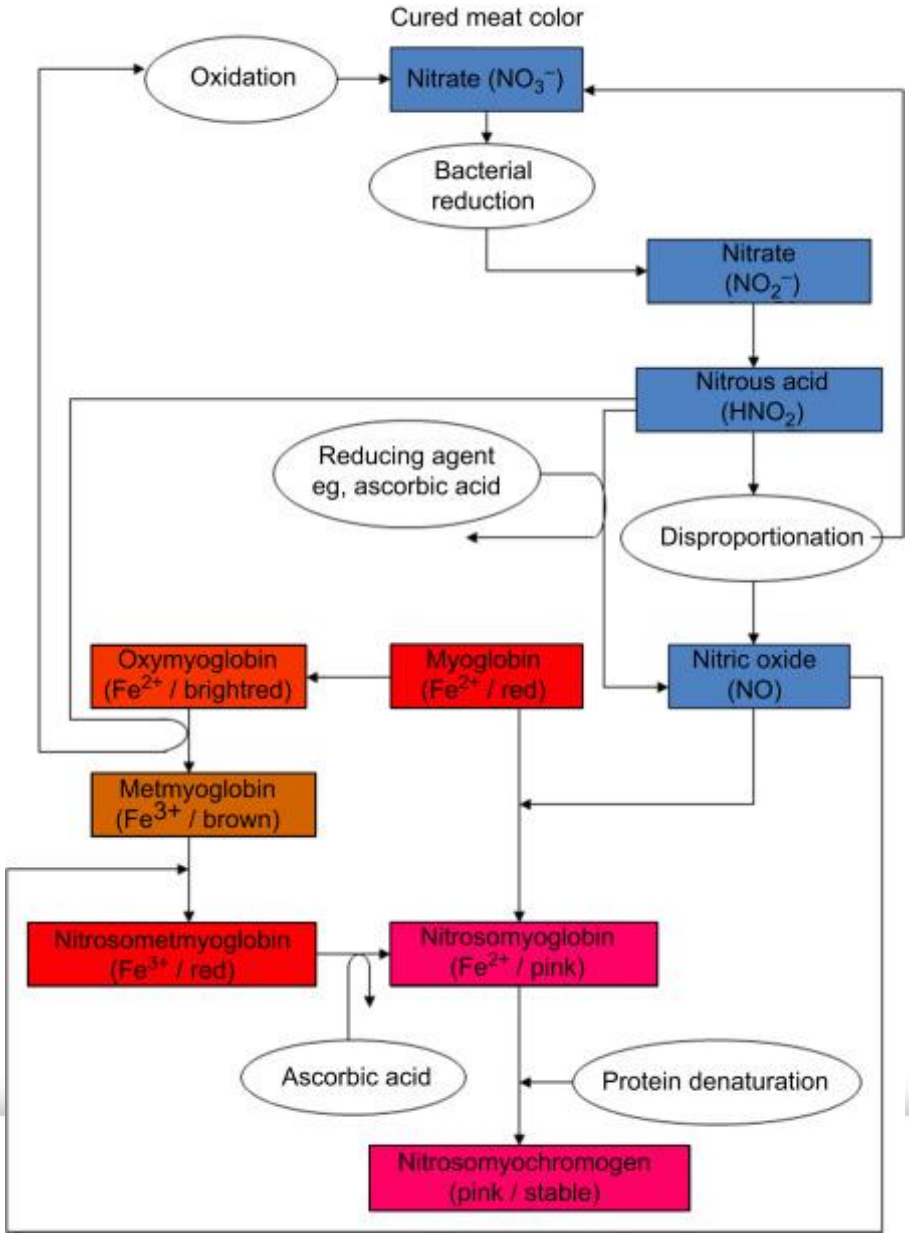
Overview of the color stabilization process in cured meat



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