Meet Akzo Nobel

Leading global paints and coatings company and a major producer of specialty chemicals

Consistently ranked as one of the leaders in the area of sustainability; No. 2 on the Dow Jones Sustainability Index

Passionate about innovation, with 4,000 scientists at over 160 laboratories

Committed to our customers and society through our brands and hands-on community projects
Meet Akzo Nobel

€14.9 billion revenue
€2.1 billion EBITDA
€1.6 billion operating income
€3.95 earnings per share
80+ countries
45,600 employees
Trusted portfolio of global brands
Meet Chelates and Micronutrients
We have a truly global presence producing well established brands.
Where are Chelates used

Agriculture
Building & Construction
Cleaning & Detergents
**Feed & Food additives**
Gas sweetening
Metal plating & Electronics
Oil industry
Personal care
Pharma
Photography
Polymer production
Printing inks
Pulp & Paper
Textiles
The most bio-available iron against anemia
What is a metal chelate?

Metal ion + Chelating agent → Metal Chelate
The most efficient way of preventing and treating iron deficiency anemia is through food fortification.

The main challenge is avoiding undesirable color and flavor changes of the fortified food.

Also iron fortification should not cause metallic taste or teeth staining.

And most important: the iron should be effective!

### WHO recommendation:

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Flour Extraction rate</th>
<th>Compound</th>
<th>Level of nutrient to be added in parts per million (ppm) by estimated average per capita wheat flour availability (g/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>Low</td>
<td>NaFeEDTA</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ferrous Sulfate</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ferrous Fumarate</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>NaFeEDTA</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrolytic Iron</td>
<td>NR</td>
</tr>
</tbody>
</table>
Iron sources

Relative bioavailability of iron compounds

<table>
<thead>
<tr>
<th>Water soluble</th>
<th>Fe (%)</th>
<th>RBV in man</th>
</tr>
</thead>
<tbody>
<tr>
<td>FeNaEDTA ***</td>
<td>13</td>
<td>200-400</td>
</tr>
<tr>
<td>Ferrous sulphate.7H20</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Ferrous gluconate</td>
<td>12</td>
<td>89</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Soluble in dilute acid</th>
<th>Fe (%)</th>
<th>RBV in man</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrous fumarate</td>
<td>33</td>
<td>100</td>
</tr>
<tr>
<td>Ferrous succinate</td>
<td>35</td>
<td>92</td>
</tr>
<tr>
<td>Ferrous saccharate</td>
<td>10</td>
<td>74</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water insoluble</th>
<th>Fe (%)</th>
<th>RBV in man</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferric pyrophosphate</td>
<td>25</td>
<td>21~75</td>
</tr>
<tr>
<td>Ferric orthophosphate</td>
<td>28</td>
<td>25~32</td>
</tr>
</tbody>
</table>

Elemental iron:
- Electrolytic iron 98 5~100
- Carbonyl iron 98 5~20
- Reduced 97 13~148

Why FeNaEDTA for food/four fortification:
- Completely water soluble
- Highly effective, even in presence of phytate
- No teeth staining
- Virtually inert to almost all other food ingredients
- No metallic taste
- No digestive effects
- High bioavailability

Source: R. Hurrell, 1999, Mineral Fortification of Foods
*** Layrisse et al. (1977), Viteri et al. (1978), el Guindi et al. (1988), MacPhail et al. (1992), Hurrell et al. (2000), Huo et al. (2002)
Suitable application area’s

Wheat and maize flour

Derived products: bread, biscuits, pasta, instant noodles and cereals

Wheat, maize and rice: 3 main staple foods globally

Condiments

Soy sauce, fish sauce, bouillon cubes and salt

Drinks

Powdered beverages, milk and ready-to-serve lemonades (Cola, beer, sport drinks)

Supplements

Ferrazone can be used in iron containing food supplements under various forms (like syrups, sprays, tablets and powder sachets)
Products containing Ferrazone
Our commitment to society; human cities

“As a global company, we fully understand our role and responsibilities when it comes to society and contributing to the communities in which we operate. All our community activities are guided by our Human Cities initiative”
Our commitment to society; human cities
Supporting the fight against malnutrition

**Partnerships**

AIM: Amsterdam Initiative against Malnutrition; Quality Improvement Network project

(GAIN, DSM, AkzoNobel, Bless Agrifood Laboratory, Intertek Food Services)

**Longstanding relationship/sponsorship**

Smarter Futures: promotion of flour and maize fortification in Africa

**Cooperation**

BioAnalyt: field testing of micronutrients, AN validated the Fe-EDTA method in flour; currently worked on improving the acceleration of the iron Check field test