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. 1 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

AkzoNobel

[Image showing a trusted portfolio of global brands]
Meet Chelates and Micronutrients

AkzoNobel
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
Food fortification

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)a</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;75b g/day</td>
</tr>
<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&lt;sup&gt;c&lt;/sup&gt;</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>
<tr>
<td>Soluble in dilute acid</td>
<td></td>
<td></td>
</tr>
<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>
<tr>
<td>Water insoluble</td>
<td></td>
<td></td>
</tr>
<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>
<tr>
<td>Elemental iron:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrolytic iron</td>
<td>98</td>
<td>5~100</td>
</tr>
<tr>
<td>Carbonyl iron</td>
<td>98</td>
<td>5~20</td>
</tr>
<tr>
<td>Reduced</td>
<td>97</td>
<td>13~148</td>
</tr>
</tbody>
</table>

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
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 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 fortification in Africa

Cooperation

BioAnalyt: field testing of micronutrients, AN validated the Fe-EDTA method in flour; currently working on improving the acceleration of the iCheck field test
Ferrazone®
This Iron Works