EDTA chelates

- Fe EDTA
- Mn EDTA
- Zn EDTA
- Cu EDTA
- EDTA compounds
- EDTA blends

Fertilizers in unique form of microgranules for foliar application and fertigation:

- high quality
- fully water soluble

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Why chelates?

Although concentrations of micronutrients in soil and plant tissue are relatively low, they play very important role in plant metabolism which has a direct effect on plant productivity, yield, quality etc. However, uptake of microelements by roots from soil or nutrient solution could be limited due to low chemical stability of those elements in soil/solution which results in lower plant availability. To maintain micronutrients in solution in soluble form the chelating agents are used with the predominant role of EDTA (Ethylenedinitrilotetraacetic acid).

If micronutrients are not protected by chelating against fixing processes in soil or solution, the concentration of plant available forms significantly decreases in short time down to 40-50% for iron (Fe) and 10-20% for copper (Cu) at pH 6.0 as shown in Figure 1 and 2. Both, increase of pH and presence of phosphate ions could decrease the plant available forms of micronutrients down to the level of 1-2%. Therefore, only the use of chelated forms of microelements could supply plants with the amount of nutrients which meets current plants’ requirements to provide high yield and to keep plants strong and healthy.

**Figure 1. Relative availability of iron (Fe) in salt solution as affected by solution pH and phosphate presence**

**Figure 2. Relative availability of copper (Cu) in salt solution as affected by solution pH and phosphate presence**
Although concentrations of micronutrients in soil and plant tissue are relatively low, they play a very important role in plant metabolism which has a direct effect on plant productivity, yield, quality, etc. However, uptake of microelements by roots from soil or nutrient solution could be limited due to low chemical stability of those elements in soil/solution which results in lower plant availability. To maintain micronutrients in solution in soluble form the chelating agents are used with the predominant role of EDTA (Ethylene-dinitrilotetraacetic acid).

If micronutrients are not protected by chelating against fixing processes in soil or solution, the concentration of plant available forms significantly decreases in short time down to 40-50% for iron (Fe) and 10-20% for copper (Cu) at pH 6.0 as shown in Figure 1 and 2. Both, increase of pH and presence of phosphate ions could decrease the plant available forms of micronutrients down to the level of 1-2%. Therefore, only the use of chelated forms of microelements could supply plants with the amount of nutrients which meets current plants’ requirements to provide high yield and to keep plants strong and healthy.

Table 2. EDTA chelates in solid form

<table>
<thead>
<tr>
<th></th>
<th>Fe EDTA</th>
<th>Mn EDTA</th>
<th>Zn EDTA</th>
<th>Cu EDTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>concentration</td>
<td>13%</td>
<td>13%</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>pH of 1% water solution</td>
<td>5,0</td>
<td>6,5</td>
<td>7,0</td>
<td>6,5</td>
</tr>
<tr>
<td>pH of 0.1% water solution</td>
<td>5,0</td>
<td>6,0</td>
<td>6,5</td>
<td>6,0</td>
</tr>
<tr>
<td>Conductivity of 1% water sol. at 20°C</td>
<td>2,02 mS/cm</td>
<td>3,6 mS/cm</td>
<td>3,6 mS/cm</td>
<td>3,6 mS/cm</td>
</tr>
<tr>
<td>Conductivity of 0.1% water sol. at 20°C</td>
<td>0,22 mS/cm</td>
<td>0,47 mS/cm</td>
<td>0,43 mS/cm</td>
<td>0,42 mS/cm</td>
</tr>
</tbody>
</table>

PACKING OPTIONS: 1 kg, 3 kg, 15 kg, 25 kg bags and 1000 kg big bags
Table 3. EDTA biodegradable chelates in liquid form

<table>
<thead>
<tr>
<th></th>
<th>Fe EDTA</th>
<th>Mn EDTA</th>
<th>Zn EDTA</th>
<th>Cu EDTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>concentration v/v</td>
<td>6%</td>
<td>7.4%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>pH of 1% water solution</td>
<td>7.5</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>pH of 0.1% water solution</td>
<td>7.5</td>
<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
</tr>
<tr>
<td>conductivity of 0.1% water sol. at 20°C</td>
<td>0.21 mS/cm</td>
<td>0.28 mS/cm</td>
<td>0.29 mS/cm</td>
<td>0.32 mS/cm</td>
</tr>
<tr>
<td>density</td>
<td>1.19 g/cm³</td>
<td>1.31 g/cm³</td>
<td>1.36 g/cm³</td>
<td>1.35 g/cm³</td>
</tr>
</tbody>
</table>

Packing options: 10 L, 20 L Jerry cans and 1000 L IBC
Other products within the EDTA range

Apart from single microelements both in the solid and liquid forms, our offer includes also tailor-made physical blends and chemically produced compounds based on EDTA chelates. Both of them can be prepared according to a customer’s requirements and if required, they can contain molybdenum, boron, magnesium or sulphur.

Table 4. Examples of EDTA blends and compounds

<table>
<thead>
<tr>
<th>micronutrient concentration</th>
<th>micro blend 1</th>
<th>micro blend 2</th>
<th>micro compound 1</th>
<th>micro compound 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fe – 7,0%</td>
<td>Fe – 4,0%</td>
<td>Fe – 4,0%</td>
<td>Fe – 0,7%</td>
<td></td>
</tr>
<tr>
<td>Mn – 2,6%</td>
<td>Mn – 3,0%</td>
<td>Mn – 3,0%</td>
<td>Mn – 5,0%</td>
<td></td>
</tr>
<tr>
<td>Zn – 0,6%</td>
<td>Zn – 4,0%</td>
<td>Zn – 4,0%</td>
<td>Zn – 4,0%</td>
<td></td>
</tr>
<tr>
<td>Cu – 0,6%</td>
<td>Cu – 0,6%</td>
<td>Cu – 0,6%</td>
<td>Cu – 4,0%</td>
<td></td>
</tr>
<tr>
<td>Mo – 0,29%</td>
<td>B – 1,5%</td>
<td>MgO – 1,1%</td>
<td>Mo – 0,05%</td>
<td></td>
</tr>
<tr>
<td>B – 2,9%</td>
<td>MgO – 1,1%</td>
<td>Mo – 0,05%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH of 1% water solution</td>
<td>5-6</td>
<td>7,2-8,2</td>
<td>7,5</td>
<td>5,5</td>
</tr>
<tr>
<td>pH of 0,1% water solution</td>
<td>5-6</td>
<td>6-7</td>
<td>6,5</td>
<td>6</td>
</tr>
<tr>
<td>bulk density</td>
<td>0,85 g/cm³</td>
<td>0,85 g/cm³</td>
<td>0,85 g/cm³</td>
<td>0,85 g/cm³</td>
</tr>
<tr>
<td>conductivity of 0,1% sol. at 20°C</td>
<td>0,45 mS/cm</td>
<td>0,45 mS/cm</td>
<td>0,45 mS/cm</td>
<td></td>
</tr>
</tbody>
</table>

PACKING OPTIONS: 1 kg, 3 kg, 5 kg and 25 kg bags as well as 1000 kg big bags.

Other non-standard products offered within the range of EDTA chelates contain:

- Fe EDTA liquid 9% (v/v)
- Cu EDTA liquid 11% (v/v)
- ammonium Fe EDTA liquid 10% (v/v)
- ammonium Cu EDTA liquid 12% (v/v)
- ammonium Zn EDTA liquid 13.4 (v/v)
Apart from single microelements both in the solid and liquid forms, physical blends and chemically produced compounds based on EDTA chelates can be prepared according to a customer’s requirements and if required, they can contain molybdenum, boron, magnesium or sulphur.

### Table 4. Examples of EDTA blends and compounds

<table>
<thead>
<tr>
<th>Microblend 1</th>
<th>Microblend 2</th>
<th>Microcompound 1</th>
<th>Microcompound 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fe –</td>
<td>7,0%</td>
<td>Mn –</td>
<td>2,6%</td>
</tr>
<tr>
<td>Zn –</td>
<td>0,6%</td>
<td>Cu –</td>
<td>0,6%</td>
</tr>
<tr>
<td>Mo –</td>
<td>0,29%</td>
<td>B –</td>
<td>2,9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>pH of 1% water solution</th>
<th>5-6</th>
<th>2-8</th>
<th>7,55</th>
<th>6,5</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH of 0,1% water solution</td>
<td>5-6</td>
<td>-7</td>
<td>6,56</td>
<td>-</td>
</tr>
</tbody>
</table>

### Other non-standard products within the range of EDTA chelates contain:
- Fe EDTA liquid 9% (v/v)
- Cu EDTA liquid 11% (v/v)
- ammonium Fe EDTA liquid 10% (v/v)
- ammonium Cu EDTA liquid 12% (v/v)
- ammonium Zn EDTA liquid 13% (v/v)

### PACKING OPTIONS:
- 1 kg, 3 kg, 5 kg and 25 kg bags as well as 1000 kg big bags.

### Fertilizers offered by ADOB

#### STRAIGHT SOLUBLE GRADE FERTILIZERS

**CALCIUM NITRATE AND DERIVATIVES**
- Calcium nitrate
- Calmag
- Calmag Fe
- Calmag Zn
- Calciplus
- Calcibor

**MAGNESIUM NITRATE AND DERIVATIVES**
- Magnesium nitrate
- Magboron
- Magzinc
- Magplus
- Magnesium sulphate

#### MULTICOMPONENT MACROELEMENT FERTILIZERS WITH MICROELEMENTS

**LIQUID**
- **FOLIAR APPLIED**
  - Azosol® 36 Extra
  - Azosol® 34
  - Azosol® 6-12-6
  - Azosol® 12-4-6+S+amino

- **FOR ROW PLACEMENT**
  - ADOB® SB-2
  - ADOB® MA
  - ADOB® PO
  - ADOB® OR

**CRISTALLINE**
- **WATER SOLUBLE NPKs WITH MICRO**
  - NPK Foliar 18+18+18+micro
  - NPK Foliar 4+12+38+micro
  - NPK Foliar 10+40+8+micro
  - NPK Foliar 4+12+38+micro

#### MICROELEMENT FERTILIZERS

**STANDARD EDTA CHELATES**
- Fe EDTA
- Mn EDTA
- Zn EDTA
- Cu EDTA
- EDTA compounds and blends

**BIODEGRADABLE IDHA CHELATES**
- Fe IDHA
- Mn IDHA
- Zn IDHA
- Cu IDHA
- IDHA compounds and blends

**DTPA CHELATES**
- Fe DTPA

**HBED CHELATES**
- Fe HBED

**OTHER MICROELEMENT FERTILIZERS**
- ADOB® Mn
- ADOB® Zn
- ADOB® Mo
- ADOB® B
- ADOB® Cu
- ADOB® Fe