BASF Intermediates

Formic acid from BASF
The multitalented classic
Good reasons for formic acid from BASF

As the world’s most important manufacturer, we are a partner our customers can rely on for formic acid, and for more:

- We supply formic acid to you reliably, in excellent quality, around the world.
- We support you with our technical expertise.
- We foster your innovations as an expert partner.
- We advise you on using formic acid as a substitute for other acids.
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BASF Intermediates – Formic acid

We deliver high quality, reliably, around the world

- Our sales staff are at your disposal - around the world.
- We respond to your needs flexibly offering tailored logistic solutions.
- We supply customers with fairly small requirements through our distribution partners.
- Our annual capacity is 255,000 metric tons, available at two manufacturing sites and logistics centers around the world.
BASF Intermediates – Formic acid

We deliver high quality, reliably, around the world

- Optimized, fully backward-integrated production process
- Dedicated formic-acid manufacturing plants that operate continually.
- More than 30 years of manufacturing experience.
- Most stringent quality control.

Benefits for you

- You receive formic acid reliably and on request at short notice, no matter where you are.
- The high purity of our formic acid promotes the quality of your products.
- We even offer a broad range of different concentrations (85%, 94%, 99%), all of excellent quality.
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- We advise you on using formic acid as a substitute for other acids.
Our advice is based on technical expertise

We offer solutions that will move you forward:

- Your contact for technical issues.
- In over 30 years experience in handling formic acid.
- Intensive exchange, e.g. through innovation partnerships.

Benefits for you

- Customized advice on:
  - Handling and storage of formic acid
  - Application-specific questions
  - Physical and chemical properties
  - REACH – the new chemicals regulation
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- We advise you on using formic acid as a substitute for other acids.
We are the right partner for your innovations

- We support your ideas for tomorrow through our innovation partnerships.
  
  See for example the development of formic acid as a new source of energy.

- Being part of our global integrated know-how Verbund system, we have access to BASF’s multifaceted research facilities as we need them

Benefits for you

- Rely on us as your expert partner: our advice to you is backed by an interdisciplinary cluster of Research & Development expertise.

- We support you in new applications to achieve joint success faster and more thoroughly.
Good reasons for formic acid from BASF

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**BASF Intermediates – Formic acid**

**Formic acid: the efficient alternative**

## Multi-faceted applications

<table>
<thead>
<tr>
<th>Category</th>
<th>Applications</th>
</tr>
</thead>
</table>
| Neutralization and acidification | Textiles: dyeing, impregnating, pre-treatment, mercerization  
                                 | Leather: tanning, bating, dyeing and refining  
                                 | Rubber: latex coagulation  
                                 | Waste-gas treatment: desulfurization |
| Preservation              | Grass silage: preservation of green fodder  
                                 | Feed: preservation of grain, corn, etc.  
                                 | Fish silage: prevention of salmonellae  
                                 | Drinking water: salmonella control |
| Cleaner and biocide       | Industrial plants: cleaning, descaling, derusting  
                                 | Household: descaling, cleaning  
                                 | Wine casks, beer barrels and kegs  
                                 | Dairy |
| Reactant                  | Plasticizers: epoxidation of soy bean oil to ESO  
                                 | Paper: sizing agent for surfacing  
                                 | Artificial sweetener  
                                 | Semiconductor board soldering |
| Starting material         | Oilfield chemicals: formate salts (cesium, potassium formates)  
                                 | Runway deicing (potassium formate)  
                                 | Refrigerant for cold stores (potassium formate) |
Formic acid: the efficient alternative

Advantages vs. other acids:

- Highest acid density among organic acids (acid equivalent per ton)
- One of the strongest organic acids
- Less corrosive than most inorganic acids

Environmentally compatible formic acid …

- does not result in phosphate or nitrate loading of waste water
- is readily biodegradable
- has the lowest chemical oxygen demand (COD)
- and the most favorable environmental characteristics, compared to other organic acids

These properties make formic acid a sustainable, nature-identical acid.
Comparison of environmental characteristics of different acids

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Formic acid</th>
<th>Acetic acid</th>
<th>Citric acid</th>
<th>Lactic acid</th>
<th>Phosphoric acid</th>
<th>Sulfamic acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>COD g O₂/kg acid</td>
<td>348</td>
<td>1067</td>
<td>750</td>
<td>1067</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>TOC* g C/kg acid</td>
<td>261</td>
<td>400</td>
<td>375</td>
<td>400</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>N g N-NO₃/kg acid</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>144</td>
</tr>
<tr>
<td>P g P/kg acid</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>316</td>
<td>0</td>
</tr>
<tr>
<td>SO₄²⁻ g SO₄²-/kg acid</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>990</td>
</tr>
</tbody>
</table>

* Beneficial characteristic  * Detrimental characteristic

* TOC: total organic carbon - an alternative parameter to COD
Formic acid: the efficient alternative

Formic acid can substitute ...

<table>
<thead>
<tr>
<th></th>
<th>acetic acid</th>
<th>phosphoric acid and sulfamic acid</th>
<th>citric acid and lactic acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>in neutralization</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>in pH adjustment/acidification</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>in cleaning</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>as a biocide/in preservation</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Benefits for you

- Lower cost, superior performance:
  Compared to other acids, a smaller volume of formic acid achieves greater efficiency in many applications.

- Less waste water charges

- Less environmental impact
## Product specifications

<table>
<thead>
<tr>
<th>Nomenclature</th>
<th>Name</th>
<th>Formic acid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chemical name</td>
<td>Formylic acid</td>
</tr>
<tr>
<td></td>
<td>CAS number</td>
<td>64-18-6</td>
</tr>
<tr>
<td></td>
<td>EINECS number</td>
<td>200-579-1</td>
</tr>
<tr>
<td></td>
<td>INDEX number</td>
<td>607-001-00-0</td>
</tr>
<tr>
<td>Structural formula</td>
<td></td>
<td><img src="image" alt="Structural formula" /></td>
</tr>
<tr>
<td><strong>Chemical properties</strong></td>
<td>State</td>
<td>liquid</td>
</tr>
<tr>
<td></td>
<td>Color</td>
<td>clear</td>
</tr>
<tr>
<td></td>
<td>Odor</td>
<td>pungent</td>
</tr>
<tr>
<td></td>
<td>Solubility</td>
<td>mixable with water, ethanol, glycol</td>
</tr>
<tr>
<td><strong>Physical properties</strong></td>
<td>Freezing point</td>
<td>-50.8°C (85% formic acid)</td>
</tr>
<tr>
<td></td>
<td>Boiling point</td>
<td>107.3°C (85% formic acid)</td>
</tr>
<tr>
<td></td>
<td>Density at 20°C [68°F]</td>
<td>1.195 g/cm³ (85% formic acid)</td>
</tr>
<tr>
<td></td>
<td>Vapor pressure at 20°C [68°F]</td>
<td>24.2 hPa (85% formic acid)</td>
</tr>
<tr>
<td></td>
<td>Shelf life</td>
<td>3 years</td>
</tr>
</tbody>
</table>
Formic acid from BASF is registered according to …

- **REACH** Registration, Evaluation and Authorization of Chemicals (preregistered, registration pending)
- **BPD** Biocidal Products Directive (biocide applications)
- **FAMI-QS** Feed Additive and Premixture Quality System (feed applications)
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We look forward to your inquiries!

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