BASF produces 300 different amines at six production sites around the world. Along with alkyl-, alkenyl- and alicyclic amines, the company offers heterocyclic, aminic and other specialty amines. This wide range of products is complemented by an expanding portfolio of chiral amines of high optical and chemical purity. The versatile products are used mainly to manufacture process chemicals, pharmaceuticals and crop protection products, as well as cosmetic products and detergents. They also serve as the basis to produce coatings, specialty plastics, composite special fibers, lubricants and metalworking fluids.

This BASF Intermediates directory describes, presents and advertises a comprehensive portfolio of about 750 intermediates around the world. It meets important product groups in our service, data, productivity, advice and expertise. Intermediates are the downstream products resulting from the conversion of raw materials, used as raw materials for the manufacture of final products, and sold on their own.

The ISO 9001 certified intermediates are manufactured at BASF’s production sites in Europe, Latin America and Asia.

Amines for Metalworking Fluids
Selection Guide

BASF offers the broadest portfolio of hydrophilic and hydrophobic amines that combine established and innovative products to bring effective solutions to the global metalworking fluid industry. Due to their strong performance in pH-buffering and anti-corrosion properties, the amines enhance both the stability and efficiency of metalworking fluids.

Today is a key challenge for formulators to find effective amines to meet the requirements of rapidly changing parameters. The demand for multifunctional amines is a key factor for the development of future lubricant fluids, as it is a feature of the future. BASF has an extensive portfolio, which includes established and innovative products, to meet the need for continuously improved lubricant performance.

Our broad product range of polyalkylene glycol (PAG) and ester base stocks offers a very extensive performance range. Combined with our global production footprint, strong R&D competence and application expertise, BASF is committed to supply the lubricant market with effective solutions to the global metalworking fluid industry. BASF offers the broadest portfolio of hydrophilic and hydrophobic amines that combine established and innovative products to bring effective solutions to the global metalworking fluid industry.
**Performance of Amines in a Synthetic Fluid Test Matrix**

A grade performance of a synthetic fluid based on acids, neutrals, and bases is evaluated by the test matrix to determine the relative performance of BASF amines.

### Amines Selection

<table>
<thead>
<tr>
<th>Product Name</th>
<th>AMINE (Number of moles)</th>
<th>AMINE (g/mol)</th>
<th>pH in use</th>
<th>Corrosion Cast</th>
<th>Staining Cast</th>
<th>Corrosion Copper</th>
<th>Staining Copper</th>
<th>AMINES SELECTION HAZARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dicyclohexylamine (DCHA)</td>
<td>0.086</td>
<td>65.83</td>
<td>9.50</td>
<td>0.00</td>
<td>15.00</td>
<td>0.00</td>
<td>5.15</td>
<td>7.50</td>
</tr>
<tr>
<td>Monoisopropanolamine (MIPOA)</td>
<td>0.172</td>
<td>78.96</td>
<td>9.18</td>
<td>0.00</td>
<td>15.00</td>
<td>0.00</td>
<td>4.80</td>
<td>7.50</td>
</tr>
<tr>
<td>N,N-Dimethylisopropanolamine (DMIPOA)</td>
<td>0.206</td>
<td>86.96</td>
<td>9.16</td>
<td>0.00</td>
<td>13.00</td>
<td>0.00</td>
<td>5.00</td>
<td>7.50</td>
</tr>
<tr>
<td>Methyldiisopropanolamine (MDIPOA)</td>
<td>0.206</td>
<td>113.16</td>
<td>9.04</td>
<td>0.00</td>
<td>13.00</td>
<td>0.00</td>
<td>5.30</td>
<td>7.50</td>
</tr>
<tr>
<td>Triisopropanolamine (TIPOA)</td>
<td>0.278</td>
<td>122.20</td>
<td>9.02</td>
<td>0.00</td>
<td>17.00</td>
<td>0.00</td>
<td>5.30</td>
<td>7.50</td>
</tr>
</tbody>
</table>

- **ALKALINE RESERVE**
  - Total alkalinity to pH 6:
  - % of total alkalinity located above pH 8: 25%
  - Indication about how long the buffer effect is maximized.

- **AMINE EXCESS**
  - TOTAL ACIDS: 5.2, 0.036
  - TOTAL AMINES: 0.086
  - DEIONIZED WATER: Added to 100% –

### Metal Compatibility

Avoiding undesired side-effects of amines on metal surfaces is a crucial parameter for their selection. This brochure presents acute test results for corrosion and aluminum staining tested in the formulated synthetic fluid matrix.

BASF tested on the aluminium matrix in order to test the performance of formulating having a growing demand of aluminum processing, especially in aerospace and automotive industries.

- **AMINES SELECTION HAZARD**
  - CAS:
    - N,N-Dimethylisopropanolamine DMIPOA 108-16-7
    - Monoisopropanolamine MIPOA 78-96-6
    - Dimethylethanolamine DMEOA 108-01-0
    - Methyldiisopropanolamine MDIPOA 4402-30-6
    - Methyldiethanolamine MDEOA 105-59-9
    - Triisopropanolamine TIPOA 122-20-3
    - Dicyclohexylamine[n] DCHA 101-83-7

- **MICROBIAL RESISTANCE**
  - Bacteria cocktail ~10^8 CFU/ml, Yeast + Mold cocktail ~10^6 CFU/ml.
  - The injection is based on a large spectrum of bacteria, yeast and mold. A bactericide (N,N'-Methylene-bis(2-cyanopropene)) and biocides (N,N'-Methylene-bis(2-cyanopropene)) have been tested for the effectiveness of amines against different side-effects.

### Microbial Resistance

A sufficient alkaline reserve provided by selected amines, in combination with registered biocides, is necessary to create a long-lasting effective antimicrobial fluid. Hydrophobic amines are not recommended to be used by themselves. Microbial resistant amines are a key component of a successful formulation.

The performance test was designed to test the microbial resistances of each amine towards microbial degradation. Staining tests are a more reliable indicator of overall degradation than pH of the measurement of the amount of metal ions released. Tests for compatibility and antibacterial activity were tested under the relative performance profile. Tests for the fluid to the presence of microorganisms were performed. For all tests, the inhibited growth rate was used. All inhibition results were provided as % of the control.

- **Metal Compatibility**
  - Tests conditions cast and copper: The test conducted tests, using the method DIN 51360, were conducted on the formulated synthetic fluid matrix at 4% in tap water (this concentration has been chosen to emphasize the differences between amines).
  - Copper corrosion tests were made on copper samples in deionized water (pH 7.0) to generate higher differentiation.