DESCRIPTION
INSOL-U-25® and STA-FORM 60® urea-formaldehyde concentrates (UFC) are clear, viscous liquids consisting of formaldehyde, urea, and a small amount of water. They provide some of the highest concentrations of formaldehyde commercially available in an easy-to-use form.

Benefits of INSOL-U-25 and STA-FORM 60 UFC include:

• Longer storage stability in contrast to conventional aqueous formaldehyde solutions.
• Can be stored at ambient temperatures.
• Convenient source of both urea and formaldehyde since active components are already in liquid form.
• Less storage space required since urea and formaldehyde are combined and do not require separate storage tanks.
• Reduced cycle times since part of the combination reaction between urea and formaldehyde has already occurred and only one material is metered to the process.

USES AND APPLICATIONS
INSOL-U-25 and STA-FORM 60 UFC can be used in many applications where urea and formaldehyde are required ingredients.

A major application for UFC is as a precursor in the manufacture of liquid and dry nitrogen-based lawn and shrub fertilizers.

Another major use for these products is in the preparation of urea-formaldehyde resins for wood product adhesives.

PRODUCT HANDLING
UFC contains formaldehyde which has a strong odor and at high levels can cause irritation of the eyes, skin, nose and throat. Do not get in eyes, on skin, or on clothing. Avoid prolonged or repeated skin contact. Wash thoroughly with soap and water after handling. Launder contaminated clothing before reuse. Discard contaminated shoes. Avoid prolonged or repeated breathing of vapor or mist. Keep containers closed when not in use. Use only in well ventilated areas.

Additional information on the safe handling of UFC is in the Material Safety Data Sheet available from Georgia-Pacific Chemicals.

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Type</th>
<th>urea-formaldehyde concentrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form supplied</td>
<td>liquid</td>
</tr>
<tr>
<td>Color, APHA</td>
<td>10 maximum</td>
</tr>
<tr>
<td>Formaldehyde, weight %</td>
<td>60.0 ± 0.5</td>
</tr>
<tr>
<td>Urea, weight %</td>
<td>25.0 ± 0.5</td>
</tr>
<tr>
<td>Active materials, weight %</td>
<td>85.0 ± 1.0</td>
</tr>
<tr>
<td>Viscosity, cps</td>
<td>240 - 600*</td>
</tr>
<tr>
<td>Specific gravity at 25°C</td>
<td>1.325 ± 0.005</td>
</tr>
<tr>
<td>Weight per gallon, lb</td>
<td>11.0 (average)</td>
</tr>
<tr>
<td>pH</td>
<td>7.0 - 8.5*</td>
</tr>
<tr>
<td>Specific heat at 45°C, cal/g</td>
<td>0.586</td>
</tr>
<tr>
<td>Electrical conductivity at 26°C, mho</td>
<td>32</td>
</tr>
<tr>
<td>Congealing point, °F</td>
<td>below -14</td>
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<tr>
<td>Boiling point, °F</td>
<td>212</td>
</tr>
<tr>
<td>Flash point, °F (Pensky-Martens Closed Cup)</td>
<td>176</td>
</tr>
<tr>
<td>Solubility in 100 grams UFC at 25°C</td>
<td></td>
</tr>
<tr>
<td>water</td>
<td>miscible</td>
</tr>
<tr>
<td>methanol</td>
<td>miscible</td>
</tr>
<tr>
<td>ethanol</td>
<td>miscible</td>
</tr>
<tr>
<td>n-butanol</td>
<td>15 grams</td>
</tr>
<tr>
<td>urea</td>
<td>81 grams</td>
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Vapor pressure, mm Hg (Torr):

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Pressure</th>
</tr>
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<tbody>
<tr>
<td>at 25°C</td>
<td>10</td>
</tr>
<tr>
<td>at 39°C</td>
<td>31</td>
</tr>
<tr>
<td>at 49°C</td>
<td>50</td>
</tr>
<tr>
<td>at 62°C</td>
<td>100</td>
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</table>

TEMPERATURE REQUIREMENTS
INSOL-U-25® and STA-FORM 60® UFC remain stable unless subjected to temperature extremes. The viscosity of the
product increases with lower temperatures. At tempera-
tures between -4°F and -22°F, these products become vis-
cous and glass-like, but they will return to normal viscosity
with warming. (See Figure 1) However, prolonged tem-
peratures above 95°F also result in a rapid and permanent
viscosity increase and are not recommended.

Therefore, the product should be maintained at tempera-
tures between 77°F and 95°F during shipping, unloading
and storage, although temperatures as low as -4°F can be
tolerated without a permanent viscosity effect.

**SHIPPING, UNLOADING AND TRANSFER**

Georgia-Pacific ships INSOL-U-25® and STA-FORM 60®
UFC in stainless steel tank trucks and in 20,000-gallon in-
sulated resin-lined cars. They are shipped at a tempera-
ture between 77°F and 95°F.

Tank cars and tank trucks must be unloaded by pump. In
accordance with OSHA regulations, unloading by air pres-
sure is not permitted.

For truck unloading, the driver will hook up the transfer
hoses to the truck and open the outlet valve. Plant person-
nel are responsible for making proper connections to the
plant unloading line as well as the operation of all pumps
and valves in the lines to the storage tank.

Since the viscosity of the product increases with lower tem-
peratures, it is recommended that the concentrate be kept
warm during transit for ease in unloading.

In climates where low temperatures are likely, transfer
lines to storage should be insulated and heat-traced or
steam-traced. This helps to maintain product flow during
transfer and helps to prevent the lines from plugging.

Once the lines are warm, the heat source should be cut off
so that the product is not overheated. High viscosities cre-
ated from short periods of cooling can be reversed by
warming with agitation to recommended temperatures.

**STORAGE**

The pH of UFC gradually drops when stored at room tem-
perature (See Figure 2) and process adjustments may be
necessary.

UFC should be stored in well-ventilated areas away from
strong acids and oxidizing and alkaline materials.

Storage tanks of aluminum, resin-lined mild steel, or stain-
less steel are recommended. Since some contamination
can occur with prolonged storage in aluminum or resin-
lined mild steel, storage tanks of stainless steel may be pre-
ferred.

UFC has been found generally to be less corrosive than
aqueous formaldehyde solutions.

Indoor storage is recommended. Outdoor storage tanks
should be shielded from the direct rays of the sun to main-
tain temperatures below 95°F.

If outside storage is necessary, or if low indoor temperatures
are expected, insulated storage and some means of heating
the tank, such as inside heating coils, should be considered.
Hot water (127°F) is preferable to steam for heating.

Agitation inside the tank is also recommended to avoid hot
spots and to maintain uniform viscosity.

Centrifugal pumps are recommended for UFC transfer. The
pump horsepower required is generally twice that needed to
transfer formaldehyde solutions with the same rate of flow.
Mechanical pump seals are recommended.

INSOL-U-25 and STA-FORM 60 are stable for at least six
months when stored under recommended conditions.