AQUCAR™ BP 10 Water Treatment Microbiocide  
AQUCAR™ BP 30 Water Treatment Microbiocide

Liquid Preservatives For Treatment Of Industrial Process Systems

**General**

AQUCAR™ BP liquid preservatives contain the active ingredient 2-bromo-2-nitro-1,3-propanediol (bronopol) and are used for controlling bacterial growth in industrial process systems such as industrial process waters, recirculating water, cooling towers and evaporative condensers, oil production and transport, and pulp and paper production.

AQUCAR BP liquid preservatives are EPA-registered. They are available in 10% (AQUCAR BP 10 Water Treatment Microbiocide) and 30% (AQUCAR BP 30 Water Treatment Microbiocide) active solutions in water and propylene glycol.

AQUCAR BP liquid preservatives provide the following benefits when used in industrial process systems and other water-containing systems:

- Broad-spectrum bacterial efficacy
- Control of *Pseudomonas* sp.
- Control of slime-forming bacteria
- Control of anaerobic bacteria responsible for microbiologically-induced corrosion
- Especially effective in combination with other biocides

**Structure**

\[
\begin{align*}
\text{HOCH}_2\text{CCH}_2\text{OH} \\
\text{NO}_2 \\
\text{Br}
\end{align*}
\]

**Physical Properties**

The following are typical properties of AQUCAR™ BP liquid preservatives; they are not to be considered product specifications.

**AQUCAR™ BP 10**

- **Appearance:** Pale yellow to colorless liquid
- **Active, % by wt.:** 9.5-10.5
- **Propylene Glycol, % by wt.:** ~10
- **Water, % by wt.:** ~80
- **pH (as is):** 2.0-6.0
- **Density @ 20°C:** 1.04-1.07
- **Flash point:** Does not have a flash point as measured by SETAFLASH Closed Cup
- **Freeze point:** -8°C to -18°C/17.6°F to -0.4°F
- **Solubility in water:** Miscible
AQUCAR™ BP 30
Water Treatment Microbiocide
EPA Reg. No. 464-685
CAS Reg. No. 52-51-7
EINECS No. 2001430

Appearance: ............................................................... Pale yellow to colorless liquid
Active, % by wt.: ..................................................... 29.1-30.9
Propylene Glycol, % by wt.: ................................. ~60
Water, % by wt.: ....................................................... ~10
pH (as is): ............................................................. 4.5 Max.
Density @ 20°C: ....................................................... 1.19-1.21
Flash point: Does not have a flash point as measured by SETAFLASH Closed Cup
Freeze point: ........................................................... -25°C/-13°F
Solubility in water: ............................................... Miscible

FDA Clearances
21CFR176.170 Components of paper and paperboard in contact with aqueous and fatty foods
21CFR176.180 Components of paper and paperboard in contact with dry food
21CFR176.300 Slimicide for use in manufacture of paper and paperboard intended to contact food

Antimicrobial Activity
AQUCAR™ BP liquid preservatives are effective against a broad array of bacteria as illustrated by the minimum inhibitory concentrations (MIC) listed below. These data are intended only as an indication of the broad spectrum of activity of AQUCAR BP liquid preservatives and should not be interpreted as having relevance to the effectiveness or dosage against specific bacteria in formulated products or process systems.

<table>
<thead>
<tr>
<th>Organism</th>
<th>MIC (ppm active ingredient)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudomonas putida</td>
<td>25</td>
</tr>
<tr>
<td>Pseudomonas cepacia</td>
<td>25</td>
</tr>
<tr>
<td>Pseudomonas stutzeri</td>
<td>25</td>
</tr>
<tr>
<td>Pseudomonas fluorescens</td>
<td>25</td>
</tr>
<tr>
<td>Desulfovibrio sp</td>
<td>0.39-12.5</td>
</tr>
</tbody>
</table>

AQUCAR BP liquid preservatives are very effective at controlling the anaerobic sulfate-reducing bacteria (SRB) that are responsible for causing microbiologically influenced corrosion as well as generating gases such as H₂S. AQUCAR BP liquid preservatives exhibit limited fungal efficacy at typical use levels.

In order to obtain the full benefits of AQUCAR BP liquid preservatives, avoid use in systems containing reducing agents or secondary amines. In neutral to alkaline systems bronopol can slowly decompose to release nitrite ions. In the presence of secondary amines these nitrite ions have the potential to form nitrosamines. Bronopol itself is not a nitrosating agent. It is also recommended that AQUCAR BP liquid preservatives should not be subjected to temperatures greater than 40°C to avoid decomposition. For formulations that will be repeatedly exposed to microbial challenges during use and storage (user opening and closing product container) the optimum pH range for use of these preservatives is below 8; however, products that are greater than pH 8 can still be preserved with AQUCAR BP liquid preservatives. Testing should be performed to confirm that preservation meets the requirements outlined for the product.

Formulating Considerations
The active ingredient in AQUCAR™ BP liquid preservatives, bronopol, is compatible with a range of materials used in water treatment, pulp and paper and other process applications. Compatible materials include compounds such as scale inhibitors, pitch stabilizers, sizing agents, retention aids, flocculants and other biocides. However, strong reducing agents such as bisulfite (>50ppm) and oxidizing agents such as free residual chlorine (>5ppm) should be avoided. AQUCAR BP liquid preservatives maintain their antimicrobial activity over a wide pH range despite some decrease in chemical stability as conditions become more alkaline (pH < 8.5).
AQUCAR™ BP liquid preservatives can be used alone or in combination with other compatible biocides. The use of multiple preservatives provides additional protection against bacterial and fungal spoilage. In addition, combination systems can be more cost effective. Multiple biocide combinations help prevent the establishment of populations of organisms resistant to a single biocide.

AQUCAR BP liquid preservatives can be used in combination with a wide variety of biocides. The most popular combinations are those with 5 chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-4-isothiazolin-3-one (CMIT/MIT). The dosage levels of CMIT/MIT, typically 25-30 ppm active ingredient for preservation applications, can be reduced to 7.5 to 15 ppm active ingredient when combined with 100-200 ppm (active ingredient) AQUCAR BP liquid preservatives.

The benefits of the combination of these two actives are as follows:

- Synergistic activity has been reported between bronopol and isothiazolinones in both the USA and Japan.
- Pseudomonas efficacy – AQUCAR BP liquid preservatives have extremely good efficacy against Pseudomonas, a weakness of isothiazolinone chemistry.
- AQUCAR BP liquid preservatives can improve the stability of CMIT/MIT in the presence of reducing agents.

<table>
<thead>
<tr>
<th>Applications</th>
<th>Recommended Product</th>
<th>Purpose</th>
<th>Suggested Concentrations of AQUCAR™ BP Liquid Preservatives</th>
<th>How to Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulp and Paper</td>
<td>AQUCAR BP 10, AQUCAR BP 30</td>
<td>To control slime-forming bacteria in process water and bulk pulp.</td>
<td>10-250 ppm of AQUCAR BP 10 or BP 30 as active ingredient for process water. 50-200 ppm of AQUCAR BP 10 or BP 30 for bulk pulp.</td>
<td>Add to the hydropulper, machine chest or stock chest.</td>
</tr>
<tr>
<td>Water Treatment</td>
<td>AQUCAR BP 10, AQUCAR BP 30</td>
<td>To control slime-forming bacteria and algae in recirculating water cooling towers, evaporative condensers, industrial process water, and air scrubber, air conditioner and humidifier systems.</td>
<td>25-100 ppm of AQUCAR BP 10 or BP 30 as active ingredient.</td>
<td>Add directly into the sump or basin at any point where there is adequate agitation to ensure dissolution.</td>
</tr>
<tr>
<td>Oil and Gas Fluids</td>
<td>AQUCAR BP 10, AQUCAR BP 30</td>
<td>To control aerobic and anaerobic, especially sulfate-reducing bacteria in oil and gas-related production.</td>
<td>50-100 ppm of AQUCAR BP 10 or BP 30. Well squeeze fluids should be dosed at 25-200 ppm active ingredient.</td>
<td>Add at any convenient point.</td>
</tr>
<tr>
<td>Oil Process Water</td>
<td>AQUCAR BP 10, AQUCAR BP 30</td>
<td>To inhibit the growth of slime-forming bacteria and sulfate-reducing bacteria in oil and gas well injection and formation waters.</td>
<td>25-200 ppm of AQUCAR BP 10 or BP 30 as active ingredient.</td>
<td>Slug dose at any time into the process waters.</td>
</tr>
<tr>
<td>Oil and Gas Transportation and Storage</td>
<td>AQUCAR BP 10, AQUCAR BP 30</td>
<td>For protection against microbial-induced corrosion in pipelines and water bottoms in tanks.</td>
<td>25-200 ppm of AQUCAR BP 10 or BP 30 as active ingredient.</td>
<td>Add directly into the water bottom, pipeline or hydrocarbon phase.</td>
</tr>
</tbody>
</table>

**Applications/ Directions for Use**

AQUCAR™ BP liquid preservatives are registered for the following end-use applications.

**Pulp and Paper**

AQUCAR™ BP 10 Water Treatment Microbiocide and AQUCAR™ BP 30 Water Treatment Microbiocide liquid preservatives can be used to control microbiological growth in paper and paperboard manufacturing processes such as paper mill process water, bulk pulp, and starch, pigment, and extender slurries used in paper coating applications. AQUCAR BP
liquid preservatives have FDA clearances for use as a paper slimicide (21 CFR 176.300), as a component of paper and paperboard in contact with aqueous and fatty foods (21 CFR 176.170), and as a component of paper and paperboard in contact with dry foods (21 CFR 176.180).

**Paper Process Waters**
In paper process waters AQUCAR™ BP 10 Water Treatment Microbiocide and AQUCAR™ BP 30 Water Treatment Microbiocide liquid preservatives can be used to control slime-forming bacteria in paper or paperboard process water systems. AQUCAR BP liquid preservatives should be dosed at a convenient point early in the process system. Dosing points may include the machine chest, headbox or white water loop. AQUCAR BP liquid preservatives should be slug-dosed several times daily in quantities sufficient to meet the required dose based on the daily production of finished product. Dose between 10-250 ppm of AQUCAR BP 10 or AQUCAR BP 30 on an active basis.

**Bulk Pulp**
To preserve bulk quantities of pulp in paper and paperboard manufacturing systems or to prevent foul odors and deterioration of pulp stock when stored for significant periods of time, add AQUCAR™ BP 10 Water Treatment Microbiocide and AQUCAR™ BP 30 Water Treatment Microbiocide liquid preservatives directly into the hydropulper, machine chest or stock chest. A single slug dose will provide microbiological control for up to three days or longer depending on the degree of contamination of the stock. In highly contaminated pulps, repeat dosing may be required every 1-7 days. The recommended dosage rate for AQUCAR BP 10 and AQUCAR BP 30 is 50-200 ppm active ingredient.

**Water Treatment**

**Industrial Recirculating Water Cooling Towers and Evaporative Condensers**
For control of slime-forming bacteria and algae in recirculating water cooling towers and evaporative condensers, dose AQUCAR™ BP 10 or AQUCAR™ BP 30 liquid preservatives directly into the sump or basin at any point where there is adequate agitation to ensure rapid dispersion throughout the system. AQUCAR BP 10 and AQUCAR BP 30 should be dosed 25-100 ppm active ingredient.

**Industrial Process Water**
AQUCAR™ BP 10 Water Treatment Microbiocide and AQUCAR™ BP 30 Water Treatment Microbiocide liquid preservatives may be used to effectively control bacterial and algal growth in industrial process water including closed-circuit machine cooling and stored water (non-potable) as well as to reduce the biofouling of pipework, heat exchangers, condenser tubes and to minimize microbiologically-influenced corrosion. Dosing should be carried out in the sump/tank of the process water system where a slug dose is preferred. AQUCAR BP liquid preservatives can also be used as an intermittent flush treatment during regular maintenance cleaning of water tanks (non-potable) or equipment. In open systems, slug dosing of AQUCAR BP liquid preservatives should be carried out on a once-a-week to once-a-month basis, depending on the degree of contamination. In closed-circuit systems, with minimal loss of AQUCAR BP 10 and AQUCAR BP 30, less frequent dosing (1-2 times/month) should be adequate. The recommended dose rate for AQUCAR BP 10 and AQUCAR BP 30 is 10-100 ppm active ingredient.

**Oil Field and Fuel Applications**

**Oil and Gas Fluids**
AQUCAR™ BP 10 Water Treatment Microbiocide and AQUCAR™ BP 30 Water Treatment Microbiocide liquid preservatives can be used to control microbiological contamination and degradation of a variety of gels and fluids caused by cellulolytic, slime-forming and sulfate-reducing bacteria. The types of fluids to be preserved include fracturing, enhanced oil recovery, injection, well squeeze, drilling, workover and completion. AQUCAR liquid
preservatives may be pre-mixed or added directly to the fluids and should be added at a dosage rate of 50-100 ppm active ingredient. Well squeeze fluids may require dosages ranging from 25-200 ppm active ingredient.

**Oil Process Water**

AQUCAR™ BP 10 Water Treatment Microbiocide and AQUCAR™ BP 30 Water Treatment Microbiocide liquid preservatives can be used to inhibit the growth of slime-forming bacteria or corrosion inducing sulfate-reducing bacteria in oil and gas well injection and formation waters. AQUCAR BP liquid preservatives should be injected as a slug-dose at any point, and should be added at 25-200 ppm active ingredient.

**Oil and Gas Transportation and Storage**

AQUCAR™ BP 10 Water Treatment Microbiocide and AQUCAR™ BP 30 Water Treatment Microbiocide liquid preservatives can be used to control bacterial contamination in water bottoms in crude and refined hydrocarbon storage tanks, piping and transportation systems. Add AQUCAR BP liquid preservatives directly into the water bottom or pipeline, or it may be added to the hydrocarbon phase. Treatment rates for AQUCAR BP liquid preservatives vary from once daily for pipeline maintenance to once every 1-2 months for storage and transportation systems. Addition to the hydrocarbon phase will result in longer protection by gradual diffusion of the active ingredient into the water phase. AQUCAR BP 10 and AQUCAR BP 30 should be applied to reach a target dosage of 25-200 ppm active ingredient.

**Toxicity**

Please refer to the Safety Data Sheet (SDS) for this product for toxicity information.

**First Aid**

Please refer to the Safety Data Sheet (SDS) for this product for first aid information.

**Precautionary Labeling**

Labels for AQUCAR™ BP 10 Water Treatment Microbiocide and AQUCAR™ BP 30 Water Treatment Microbiocide liquid preservatives bear these caution statements:

**AQUCAR BP 10**

DANGER

CORROSIVE.

CAUSES IRREVERSIBLE EYE DAMAGE AND SKIN IRRITATION.

HARMFUL IF SWALLOWED, ABSORBED THROUGH THE SKIN, OR INHALED.

PROLONGED OR FREQUENTLY REPEATED SKIN CONTACT MAY CAUSE ALLERGIC REACTIONS IN SOME INDIVIDUALS.

**AQUCAR BP 30**

DANGER

CORROSIVE.

MAY CAUSE IRREVERSIBLE EYE DAMAGE.

HARMFUL IF SWALLOWED, ABSORBED THROUGH THE SKIN OR INHALED.

MAY CAUSE SKIN BURNS.
Storage, Handling and Disposal

Persons handling AQUCAR™ BP 10 Water Treatment Microbiocide and AQUCAR™ BP 30 Water Treatment Microbiocide liquid preservatives should wear rubber gloves and apron and safety glasses or chemical goggles to prevent contact with eyes or skin. Because of their very low vapor pressure, these products do not present an inhalation hazard. Wash thoroughly after handling.

Store AQUCAR BP liquid preservatives in their original containers in cool locations away from food or feed. They can be corrosive to metals on prolonged contact, so wash away any spills from metal surfaces.

Spills should be contained and/or absorbed in suitable inert materials such as sawdust. Small spills or residues may be flushed to sewers, which lead to treatment systems.

Shipping and Packaging

AQUCAR™ BP 10 Water Treatment Microbiocide and AQUCAR™ BP 30 Water Treatment Microbiocide liquid preservatives are classified as Class 8 Packing Group III corrosive liquids in the U.S. Department of Transportation regulations and in the international regulations for air and ocean transport because of their corrosive effects on aluminum.

The bill of lading description used by DOW is:

DISINFECTANT, LIQUID, CORROSIVE, N.O.S (2-BROMO-2-NITROPROPANE-1,3-DIOL SOLUTION) 8, UN1903,III. IN CASE OF EMERGENCY USE DOW GUIDE 5 ATTACHED. DISINFECTANT NOI, OTHER THAN MEDICINAL OR TOILET PREPARATIONS. NMFC ITEM 57100 SUB 3 CLASS 60. TRADE NAME = AQUCAR (BP 10 and BP 30).

AQUCAR™ BP 10 Water Treatment Microbiocide

<table>
<thead>
<tr>
<th>Shipping Container</th>
<th>Net Wt.</th>
<th>Gross Wt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>55-gallon HDPE drum</td>
<td>475 lb</td>
<td>497 lb</td>
</tr>
<tr>
<td>1000 liter IBC*</td>
<td>2,204 lb</td>
<td>2,486 lb</td>
</tr>
</tbody>
</table>

AQUCAR™ BP 30 Water Treatment Microbiocide

<table>
<thead>
<tr>
<th>Shipping Container</th>
<th>Net Wt.</th>
<th>Gross Wt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>55-gallon HDPE drum</td>
<td>500 lb</td>
<td>522 lb</td>
</tr>
<tr>
<td>1000 liter IBC*</td>
<td>2,645 lb</td>
<td>2,777 lb</td>
</tr>
</tbody>
</table>

*Intermediate bulk container (tote tank) with HDPE bottle and steel cage and pallet.

Product Stewardship

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products – from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.
Customer Notice

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including Safety Data Sheets (SDS), should be consulted prior to use of Dow products. Current Safety Data Sheets are available from Dow.

For further information visit our website: www.dowmicrobialcontrol.com or call:

Central and Eastern Europe:
Turkey +90-216-571-16-00
Russia +7-495-663-78-20
Poland +48-22-543-18-00
Western Europe:
+800-3-494-6367 (toll-free)
+31-115-67-26-26 (phone)
+31-115-67-28-28 (fax)
North America:
+1-800-447-4369 (toll-free)
+1-989-832-1560 (phone)
+1-989-832-1465 (fax)
Middle East and Africa:
UAE +971-4-332-88-66
South Africa +800-99-5078 (toll-free)
Greater China:
Shanghai +86-21-3851-1000
Beijing +86-10-6527-9199
Guangzhou +86-20-3813-0600
Taiwan +886-227-719-000
Southeast Asia:
Philippines +63-2-867-3293
Indonesia +62-21-2895-6273
Singapore +65-6830-4575
+65-6796-6217
Thailand +66-2265-7371
Vietnam +84-8-3822-6906
Malaysia +603-7955-5200
Australia and New Zealand:
+613-9226-3500 (phone)
+61-3-9226-3562 (fax)
Japan and Korea:
Japan +81-3-5460-2261
Korea +82-2-3490-4346
Indian Subcontinent:
+91-22-6793-4903 (phone)
+91-22-6793-4924 (fax)
Latin America:
+55-11-5188-9555 (phone)
+55-11-5188-9400 (fax)
Other Global Areas:
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