Equations for Reactions of Captor® with Ozone

CaS₂O₃ in a strong base: \( S_2O_3^{2-} + 4O_3 + 2 \text{OH}^- = 4O_2 + H_2O + 2 SO_4^{2-} \)

CaS₂O₃ in a mild acid or H₂O: \( S_2O_3^{2-} + 4 O_3 + H_2O = 4 O_2 + 2 H^+ + 2 SO_4^{2-} \)

In both equations the ratio is the same: One (1) \( S_2O_3^{2-} = Four (4) O_3 \)

A one to four ratio

It is especially useful in situations where chlorine is added, after deozoning. The lower dosage does not interfere with the chlorination, making it easier to maintain the desired chlorine residual.

Dosage Rates for Ozone Quenching

Gallons per million gallons of water or liters of Captor per 1000 cubic meters of water at 15°C

<table>
<thead>
<tr>
<th>Parts per Million Ozone</th>
<th>0.10</th>
<th>0.20</th>
<th>0.30</th>
<th>0.40</th>
<th>0.50</th>
<th>0.60</th>
<th>0.70</th>
<th>0.80</th>
<th>0.90</th>
<th>1.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25:1</td>
<td>0.35</td>
<td>0.66</td>
<td>1.30</td>
<td>1.70</td>
<td>1.70</td>
<td>2.00</td>
<td>2.30</td>
<td>2.60</td>
<td>3.00</td>
<td>3.30</td>
</tr>
<tr>
<td>0.50:1</td>
<td>0.40</td>
<td>0.80</td>
<td>1.20</td>
<td>1.60</td>
<td>2.00</td>
<td>2.40</td>
<td>2.80</td>
<td>3.20</td>
<td>3.60</td>
<td>4.00</td>
</tr>
<tr>
<td>1.00:1</td>
<td>0.50</td>
<td>1.00</td>
<td>1.50</td>
<td>2.00</td>
<td>2.50</td>
<td>3.00</td>
<td>3.50</td>
<td>4.00</td>
<td>4.50</td>
<td>5.00</td>
</tr>
</tbody>
</table>

*Note: Below 5°C increase dosage by 5%.

These rates are approximate and may be affected by factors such as temperature, reaction time and dissolved compounds in water which may react with Captor.

WARRANTY AND LIMITATION OF DAMAGES

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Captor® (calcium thiosulfate solution) is a relatively new product, now available to the potable water and wastewater treatment industries. Captor is a nearly odorless, colorless, non-hazardous, non-toxic solution. It is certified in accordance with ANSI NSF Standard 60 for drinking water applications.

Captor is now solving a number of traditional problems for water and wastewater treatment plant operators. Tank and line heating are generally not needed, and the product presents no problem with off-gassing. In ozone destruction, Captor is more efficient and requires lower dosing rates than other chemicals.

Why not modernize your treatment process with water-clear Captor? It offers several advantages over the use of alternative chemicals, including:

- A safe, non-hazardous solution
- A less corrosive material
- No potential SO2 exposure
- No off-gassing
- Water clear
- Maintains a low freezing point
- Harder to crystallize
- Applicator friendly
- Carrier water not required

### Equations for Reactions of Captor with Chlorine

1. \( \text{CaS}_2\text{O}_3 + 2 \text{Cl}_2 + 3 \text{H}_2\text{O} \rightarrow 4 \text{HCl} + \text{Ca(HSO}_3)_2 \)
2. \( \text{Ca(HSO}_3)_2 + 2 \text{Cl}_2 + 2\text{H}_2\text{O} \rightarrow 4\text{HCl} + \text{CaSO}_4 + \text{H}_2\text{SO}_4 \)
3. \( \text{CaS}_2\text{O}_3 + 4 \text{Cl}_2 + 5 \text{H}_2\text{O} \rightarrow 8 \text{HCl} + \text{CaSO}_4 + 2 \text{H}_2\text{SO}_4 \)
4. \( \text{CaS}_2\text{O}_3 + \text{Cl}_2 + \text{H}_2\text{O} \rightarrow \text{CaSO}_4 + \text{S} + 2 \text{HCl} \)

### Captor® Application Guidelines for Dechlorination

In order to maximize your prospects for success and to achieve a low, cost-effective treatment, we would like to provide you with the following application guidelines:

1. **Process Flow Control:** A simple feed pump and chlorine monitoring system is required for dechlorination with Captor. Where Sodium Bisulfite is in use, we suggest you flush-out existing lines, equipment and storage tank thoroughly prior to any use of Captor.

2. **Dosage Ratio:** Municipalities generally use a multiplier of about 1.48 pounds of Captor per pound of chlorine. This ratio has proven to be effective year-round. (Please refer to our dosage chart below for more details.)

3. **Chemical Mixing:** Good mixing is important for cost-effective dechlorination, as it can significantly reduce the amount of Captor required for treatment.

4. **Contact Time:** While Captor reduces chlorine instantaneously, it may still require a few minutes to bring lingering chlorine levels to zero residual. Please allow a adequate lag time for the treated effluent to travel from the dechlorination zone to the final chlorine residual sampling point.

5. **Maintenance:** We recommend flushing and disinfecting supply lines and day tanks at least once per year to avoid potential plugging and/or product contamination.

Please note that the guidelines listed above are the basics for using Captor in dechlorination, but general guidelines are not always sufficient to ensure both effective and efficient treatment. If you experience any issues with the performance of Captor, please give us a call – we will be happy to review your application and method, and assist you in maximizing both the efficiency and effectiveness of treatment.

### Dosage Rates for Dechlorination

<table>
<thead>
<tr>
<th>Gallons of Captor® per million gallons of water</th>
<th>Parts per Million Chlorine</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td></td>
</tr>
<tr>
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<td>5.4</td>
</tr>
<tr>
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<tr>
<td>7.2</td>
<td>5.0</td>
</tr>
<tr>
<td>7.4</td>
<td>4.9</td>
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<tr>
<td>7.6</td>
<td>4.8</td>
</tr>
<tr>
<td>7.8</td>
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<tr>
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</tr>
<tr>
<td>10.0</td>
<td>3.4</td>
</tr>
</tbody>
</table>

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