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Sodium chlorate (NaClO$_3$) is a powerful oxidizing agent available in both the crystal and solution forms manufactured and supplied by AkzoNobel.

When handled correctly, associated risks are minimal. However, like many other oxidizing chemicals, if handled incorrectly sodium chlorate can pose a serious hazard to human health, safety and the environment. Knowledge of the possible risks, correct and appropriate safeguards, and the necessary response to situations that could arise is therefore essential for anyone dealing with this chemical.

This manual contains important information on the safe handling of sodium chlorate; it has been compiled based on experience gained from many years of producing and handling this chemical.

Please do not hesitate to contact your AkzoNobel Representative for advice and instructions concerning the handling of sodium chlorate (http://www.akzonobel.com/eka/contact_us/ppc_locations/).

**Disclaimer**

Information herein is given in good faith and is accurate to the best of our knowledge. Information and suggestions are made without warranty or guarantee of results. Before using, user should determine the suitability of the product for its intended use and assess how to use the product safely in their particular manufacturing setting and user assumes the risk and liability in connection therewith. The application, use and processing of our products and the products manufactured by you on the basis of our technical advice are beyond our control and, therefore, entirely your own responsibility. We do not suggest violation of any existing patents or give permission to practice any patented invention without a license.

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Sodium chlorate has a high oxidizing potential and functions as a powerful oxidizing agent. An example of this type of reaction would be the production of chlorine dioxide.

In 2012, more than 90% of all sodium chlorate produced worldwide was consumed by the pulp industry where it is used for generation of chlorine dioxide. Chlorine dioxide is a key bleaching agent and is used in the production of Elemental Chlorine-Free (ECF) bleached wood pulp all over the world.

Below are examples of today’s technologies for producing a chlorine-free chlorine dioxide solution for ECF bleaching.

<table>
<thead>
<tr>
<th>Process</th>
<th>Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVP-LITE :</td>
<td>$12\text{NaClO}_3 + 8\text{H}_2\text{SO}_4 + 3\text{CH}_3\text{OH} \rightarrow 12\text{ClO}_2 + 3\text{HCOOH} + 9\text{H}_2\text{O} + 4\text{Na}_3\text{H(SO}<em>4)</em>{\frac{1}{2}}$</td>
</tr>
<tr>
<td>SVP-HP :</td>
<td>$2\text{NaClO}_3 + \text{H}_2\text{O}_2 + \text{H}_2\text{SO}_4 \rightarrow 2\text{ClO}_2 + \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O} + \text{O}_2$</td>
</tr>
<tr>
<td>HP-A :</td>
<td>$2\text{NaClO}_3 + \text{H}_2\text{O}_2 + 2\text{H}_2\text{SO}_4 \rightarrow 2\text{ClO}_2 + 2\text{NaHSO}_4 + \text{O}_2 + 2\text{H}_2\text{O}$</td>
</tr>
</tbody>
</table>

The major use of sodium chlorate remains in the pulp and paper industry; it is also the preferred intermediate for sodium perchlorate and sodium chlorite manufacture.

Some common industrial applications for sodium chlorate include the surface treatment of metals and cupric chloride etch regeneration in the electronics and automotive industries.

Additional uses of sodium chlorate are as an oxidant in chemical synthesis; in the mining industry for the extraction of uranium and vanadium; in the production of oxygen candles utilized on aircraft and submarines; and by manufacturers of breathing apparatus for firefighters and mine rescue crews.

**Product grades**

Sodium chlorate is available in both solution and crystal forms from our network of production facilities.

*Your AkzoNobel Representative will be pleased to help you determine which form of sodium chlorate product is appropriate for your particular application.*
Technical data and physical properties

Sodium chlorate is a white to off-white crystalline material. Crystals are similar in appearance to table salt. Sodium chlorate is odorless and very soluble in water.

In its crystal form, sodium chlorate is stable at temperatures up to 250°C. Above this temperature chlorate decomposes slowly and steadily forming salt (sodium chloride) and oxygen. Sodium chlorate in its pure form is not flammable but due to the fact it releases oxygen during decomposition it will act as an extreme combustion accellerant in the presence of flammable materials.

In liquid form, extra caution should be taken. Sodium chlorate solution is a clear odorless liquid and becomes virtually invisible (salt-like residue is often apparent) when it dries on any organic material like cloth, leather, paper or wood. All that is then required is a spark, minor friction or heat, to ignite. Sodium chlorate itself does not burn but as previously stated acts as an extreme combustion accelerator by emitting oxygen. Consequently, fires involving sodium chlorate spread very rapidly and explosively and cannot be extinguished by smothering. Other substances which cause fire in mixtures containing sodium chlorate are phosphorus, sulfur, sulfides, metallic powder and ammonium salts.

When sodium chlorate is mixed with strong acids, chlorine dioxide and or chlorine gases are formed, both are toxic and when chlorine dioxide is present may become explosive. Consequently, due to this reaction potential it is recommended to store acids and sodium chlorate crystal and/or solutions separately.
Typical properties

Please refer to the CURRENT sodium chlorate SDS for the CURRENT regulatory information about the physical properties for this product. Your AkzoNobel Representative will be able to provide you with these documents.

Sodium chlorate

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical formula</td>
<td>NaClO₃</td>
</tr>
<tr>
<td>Molecular weight</td>
<td>106.4 g/mole</td>
</tr>
<tr>
<td>Appearance</td>
<td>white to off-white crystalline material, odorless</td>
</tr>
<tr>
<td>Melting point</td>
<td>248 - 250 °C</td>
</tr>
<tr>
<td>Boiling point</td>
<td>none, is decomposed at temperatures higher than 250 - 300°C into sodium chloride and oxygen gas</td>
</tr>
<tr>
<td>Bulk density</td>
<td>approximate 1500 kg/m³</td>
</tr>
<tr>
<td>Solubility</td>
<td>soluble in water, refer to diagram on the following page</td>
</tr>
<tr>
<td>pH</td>
<td>neutral, assumes the pH of the solvent</td>
</tr>
</tbody>
</table>
Solubility of sodium chlorate in water

Density for sodium chlorate solution at different temperatures and concentrations.
Please refer to the latest product SDS in your local language for the most current regulatory information about the safety and handling of sodium chlorate. Your AkzoNobel Representative will be able to provide you with these documents. The following are guidelines for the handling and use of sodium chlorate solutions. You should assess how to use the product safely in your particular manufacturing setting.

Mandatory protective equipment when handing sodium chlorate
Because sodium chlorate should never come in contact with organic materials like cloth and leather; make sure all personnel are provided with, and required to wear, the following items:

1. A protective suit (preferred anti-flammable treated) made of vinyl, neoprene, or PVC.
2. A pair of vinyl or neoprene boots.
3. Protective goggles that fit snugly over the eyes. 4. Rubber gloves.
5. Dust mask or in instances of high dust concentrations a dust respirator.
6. A hardhat with a safety visor.

AkzoNobel recommends a number of other safeguards and procedures be observed:

1. Safety showers or jump tanks and eye wash stations should be located close to where sodium chlorate is unloaded, stored and used.
2. Do not allow sodium chlorate to accumulate. Promptly clean up spills/leaks using copious amounts of water.
3. Keep sodium chlorate areas free of any combustible organic materials, including cloth, paper, leather, paint, wood, sawdust, solvents, grease and oils.
4. Wood and leather are especially porous and absorb sodium chlorate solution so thoroughly it can't be washed out. We recommend non-leather clothing be professionally laundered before reuse, but shoes, pallets or any other organic material that gets soaked with sodium chlorate solution be destroyed by burning them in a safe and controlled environment.
5. To prevent the contamination and possible ignition, anything made of leather, including but not limited to: shoes, belts and watchbands should not be worn when handling sodium chlorate in crystal or liquid forms.
6. Smoking is expressly prohibited in areas where sodium chlorate in crystal or liquid forms may be present. Even the smallest spark or heat source can ignite combustible materials contaminated with sodium chlorate.
7. All safety clothing should be kept separate from street clothes.
8. Clean safety clothing should be worn during each shift, then washed immediately afterwards.
9. Workers should shower with soap and water after each shift.
10. Equipment contaminated with sodium chlorate crystal or liquid should be thoroughly washed with water before being transported or moved from the controlled area.
11. Sodium chlorate should always be unloaded separately from other chemical deliveries.
Personal injuries and first aid

1. **Skin:** If sodium chlorate in crystal or solution form comes in direct contact with skin and/or mucous membranes, the result can be moderate to severe irritation of skin accompanied by reddening and pain. Overexposure to the chemical may cause burns.
   
   **First aid:** Immediately get under a safety shower. Thoroughly flush affected areas for at least 15 minutes while removing contaminated clothing. Then get medical attention.

2. **Eyes:** Getting sodium chlorate in one’s eyes will be immediately apparent. Moderate to severe irritation and pain will occur. Prolonged contact may result in permanent eye damage.
   
   **First aid:** Go immediately to an eye wash station and rinse eyes thoroughly for at least 15 minutes. Then get medical attention.

3. **Inhalation:** Inhaling sodium chlorate dust may irritate the respiratory tract and mucous membranes. To minimize the potential make sure there is good ventilation in work areas. Workers should wear dust respirators where there are heavy concentrations of sodium chlorate dust.
   
   **First aid:** In case of inhalation, get fresh air. If breathing has stopped, give artificial respiration. If breathing is labored, give oxygen. Then seek medical attention immediately.

4. **Ingestion:** Swallowing sodium chlorate is harmful and, in extreme situations, could be fatal. Affected workers will exhibit abdominal pain, nausea, vomiting, diarrhea. It may cause difficulty in breathing and unconsciousness. To avoid the problem, workers should never eat or drink around sodium chlorate, and wash their hands well before eating.
   
   **First aid:** In case of ingestion, drink as much water as possible. Do not induce vomiting. Keep breathing passages clear. If the victim is unconscious, do not give anything by mouth. Then get medical attention immediately.
Fire
A fire involving sodium chlorate can spread rapidly and explosively. Attempts to smother such a fire with a blanket or a chemical fire extinguisher will have no effect because sodium chlorate gives off oxygen during decomposition. **Water**, if applied immediately, is the only possible means of controlling a fire involving sodium chlorate.

Safety action
If clothing catches fire, instantly get into a jump tank or under a safety shower and remove all clothing.

Jump tank installed at our Columbus, Mississippi facility

Procedures for safe handling
Observe the following recommendations to prevent both personal injuries and material damage at your facilities:

1. Any sodium chlorate spills or leaks should be contained, or quickly taken care of by workers wearing proper safety attire.
2. Spills should be cleaned up with a non-combustible absorbent and put in containers for disposal. (Consult your local, state and federal regulations for accepted means of disposal.)
3. Never flush sodium chlorate into water sources and public sewers.
4. Never wash sodium chlorate into a sewer where acids have been dumped or may be present. A dangerous reaction could result. For example, certain acids could turn sodium chlorate into chlorine dioxide and or chlorine, which is hazardous and toxic and may become explosive.
5. Make sure sodium chlorate never comes in contact with petroleum based oils, greases and lubricants. In rare instances when this has happened, explosions have resulted.
6. If you use sodium chlorate in supersacs, bags or drums always store directly on concrete floors. AkzoNobel does not recommend the use of wooden pallets; please use steel or plastic pallets. Any sodium chlorate crystals from a spill or a broken bag should be swept up and put into clean, dry containers. Dispose according to local, state, federal, or government regulations.
Please refer to the CURRENT sodium chlorate SDS for the CURRENT regulatory information about the transporation of this product. Your AkzoNobel Representative will be able to provide you with these documents.

AkzoNobel ships sodium chlorate all over the world, primarily by rail or truck.

Product is usually packaged in supersacs when long distance transportation is required, especially to overseas customers. Alternative packaging in small metal drums is also available.

All vessels for transportation of sodium chlorate are made of compatible materials. The supersacs, utilized for long distance transportation, are made of polypropylene/polyethylene and have an individual capacity of 1000 - 1250 kg.

Sodium chlorate is classified as hazardous goods – transportation and packaging design must therefore adhere to the international transportation regulations.

**Transportation regulations**

Sodium chlorate is supplied in crystalline and solution form and must always be packaged in UN-approved packaging. Packaging must always be marked with the required labeling.

Transportation may take place by road, railway, sea or air (sample quantities). Each mode of transport has its own regulations with special requirements regarding packaging, vehicle type and documentation.

**Examples of containers/packaging**

- **Rail car** - crystal product
- **Tanker truck** - solution product
Drum - crystal product

Hopper truck - crystal product

Supersac - crystal product
For questions regarding unloading and/or site specific material recommendations, please consult with your AkzoNobel Representative.

General unloading of sodium chlorate
All unloading operations must be performed exclusively by dependable, well-trained workers or truck drivers who are fully aware of the proper safety procedures and first aid actions.

The transporting vessel must be properly secured and warning signs in place. All unloading connections must be securely attached before opening any discharge valves. A dedicated worker or a truck driver must be present at all times to monitor the attachment of connections and the unloading of the vessel.

Be sure to unload incompatible materials, such as strong acids or combustibles, in a separate area isolated from the sodium chlorate facility.

Unloading crystal product
Because of its high solubility in water, sodium chlorate crystals can be easily dissolved and unloaded as a liquid solution. Hot water circulating between the vessel and a mixing tank dissolves the chlorate crystals and forms the desired solution. Since the dissolving action absorbs heat, it is necessary to pre-heat the solution water to 65 - 80 °C (142 - 180 °F). During the unloading process, this temperature should not drop below 45 °C (113 °F). A source of additional heat, such as steam coils within the mixing tank or an external heat exchanger in the recirculation line, should be provided to maintain an adequate temperature.

The volume of water needed to unload a delivery will depend on both the amount of sodium chlorate delivered and the concentration required. The information provided in the tables presented on page 14 gives an example of recipes for various sodium chlorate concentrations.

Be sure the storage tank has adequate capacity for the solution to be received, see final volumes detailed in the tables presented on page 14.

Unloading and dissolving crystal product from supersacs
When sodium chlorate is shipped in supersacs, each bag has to be lifted up by a truck or a crane, tipped into a discharging unit and fed to a dissolving tank.

Please contact your AkzoNobel Representative for specific recommendations on the design of the discharging unit and dissolving tank system.
Sodium chlorate crystal - dilution water requirements and final volume.

**Metric units**

<table>
<thead>
<tr>
<th>Desired Concentration (g/l)</th>
<th>Dissolving water m³/metric tonne sodium chlorate @ 65°C</th>
<th>Dissolving water m³/metric tonne sodium chlorate @ 80°C</th>
<th>Final Volume/metric tonne dissolved sodium chlorate</th>
</tr>
</thead>
<tbody>
<tr>
<td>550</td>
<td>1.39m³/tonne</td>
<td>1.37m³/tonne</td>
<td>1.82m³/tonne</td>
</tr>
<tr>
<td>600</td>
<td>1.11m³/tonne</td>
<td>1.10m³/tonne</td>
<td>1.54m³/tonne</td>
</tr>
<tr>
<td>650</td>
<td>1.00m³/tonne</td>
<td>0.99m³/tonne</td>
<td>1.43m³/tonne</td>
</tr>
<tr>
<td>700</td>
<td>0.96m³/tonne</td>
<td>0.95m³/tonne</td>
<td>1.39m³/tonne</td>
</tr>
</tbody>
</table>

**Imperial units**

<table>
<thead>
<tr>
<th>Desired Concentration (g/l)</th>
<th>Dissolving water US Gal/short ton sodium chlorate @ 175°F</th>
<th>Final Volume/short ton dissolved sodium chlorate</th>
</tr>
</thead>
<tbody>
<tr>
<td>550</td>
<td>330 gallons/ton</td>
<td>435 gallons/ton</td>
</tr>
<tr>
<td>600</td>
<td>300 gallons/ton</td>
<td>410 gallons/ton</td>
</tr>
<tr>
<td>650</td>
<td>265 gallons/ton</td>
<td>370 gallons/ton</td>
</tr>
<tr>
<td>700</td>
<td>238 gallons/ton</td>
<td>345 gallons/ton</td>
</tr>
</tbody>
</table>
Specific gravity of sodium chlorate solutions at various temperatures

Sodium Chlorate Solution

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Specific Gravity (SG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>51°C (125°F)</td>
<td>1.365</td>
</tr>
<tr>
<td>60°C (140°F)</td>
<td>1.375</td>
</tr>
<tr>
<td>71°C (160°F)</td>
<td>1.405</td>
</tr>
</tbody>
</table>
For site specific material recommendations, please consult with your AkzoNobel Representative.

Materials in general
Please refer to the information presented in the table on page 18. In general, 316L stainless steel and titanium are recommended as the most appropriate design materials for pure sodium chlorate.

Electrical systems must be dust-proof and comply with all applicable code standards. Electrical motors must be explosion proof and completely sealed.

For fully dissolved sodium chlorate solutions it is recommended that pipes, valves and connectors be made of 316L stainless steel, titanium, Kynar® lined steel piping or FRP. Pipes, valves and connectors used with partially dissolved sodium chlorate slurries should only be made from 316L stainless steel or titanium.

Centrifugal pumps are the best choice for conveying sodium chlorate solutions. The pump must have a double mechanical seal with a minimum differential pressure of 35 kPa. A suitable design material would be titanium or 316L stainless steel.

Heat exchangers should be of Monel® 400 or titanium construction.

Gaskets must be made of inert materials such as Teflon®, Hypalon® or EPDM.

Petroleum-based lubricants should not be used. It is recommended that fluorinated lubricants are utilized on sodium chlorate systems.

Hoses must be made of EPDM, Teflon® or FEP.
Tanks
Storage tanks must be large enough to receive a full delivery. In general, the tank should be one and a half times the normal anticipated delivery volume.

Tanks should be constructed of FRP with added fire retardant or 316L stainless steel. If 316L stainless steel is used, measures to avoid stress corrosion should be employed.

Labeling on tanks
All tanks containing sodium chlorate should be labeled SODIUM CHLORATE SOLUTION and should have the required hazard labels. Follow the regulation given in the local country’s safety data sheets, SDS. If you have questions regarding the proper labeling, please contact your AkzoNobel Representative.

Location of tanks
Tanks are to be surrounded by containment dikes and must be separated from areas containing flammable substances or where strong acids are being handled. Pipelines for other substances (e.g. sulphuric acid) should not be laid where any leaks can come into contact with spillages of sodium chlorate.

The discharging area should be located in an easily accessible position. All risk of the sodium chlorate being mixed with other chemicals must be eliminated.
## Construction materials for sodium chlorate systems

<table>
<thead>
<tr>
<th>Vessel</th>
<th>Recommended materials</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tanks</strong></td>
<td>FRP</td>
</tr>
<tr>
<td></td>
<td>316L Stainless Steel (SS 2353) Alloy</td>
</tr>
<tr>
<td></td>
<td>Titanium</td>
</tr>
<tr>
<td><strong>Pipes fully dissolved solution</strong></td>
<td>316L Stainless Steel (SS 2353) Alloy</td>
</tr>
<tr>
<td></td>
<td>FRP or CPVC wrapped with FRP</td>
</tr>
<tr>
<td></td>
<td>Titanium, Kynar lined steel</td>
</tr>
<tr>
<td><strong>Pipes partially dissolved slurry</strong></td>
<td>316L Stainless Steel (SS 2353) Alloy</td>
</tr>
<tr>
<td></td>
<td>Titanium</td>
</tr>
<tr>
<td><strong>Heat Exchanger Plates</strong></td>
<td>Monel 400</td>
</tr>
<tr>
<td></td>
<td>Titanium</td>
</tr>
<tr>
<td><strong>Pumps</strong></td>
<td>Titanium</td>
</tr>
<tr>
<td></td>
<td>316L Stainless Steel (SS 2353) Alloy</td>
</tr>
<tr>
<td><strong>Valves</strong></td>
<td>316L Stainless Steel (SS 2353) Alloy</td>
</tr>
<tr>
<td></td>
<td>Titanium</td>
</tr>
<tr>
<td></td>
<td>Teflon or Kynar lined steel, FRP</td>
</tr>
<tr>
<td><strong>Gaskets</strong></td>
<td>Teflon</td>
</tr>
<tr>
<td></td>
<td>EPDM</td>
</tr>
<tr>
<td><strong>Hoses</strong></td>
<td>EPDM</td>
</tr>
<tr>
<td></td>
<td>Teflon</td>
</tr>
<tr>
<td></td>
<td>FEP</td>
</tr>
</tbody>
</table>
Analytical procedures

Sodium chlorate concentration in chlorate feed solution

Safety
- Read the Safety Data Sheets for the chemicals before starting.
- Study local regulations for information about handling of hazardous chemicals and waste.
- Clothes contaminated with sodium chlorate can self ignite. Thoroughly wash with plenty of water if clothes are contaminated. However, contaminated leather clothes cannot be laundered and must be disposed immediately.
- Rinse with plenty of water if there is chlorate on the skin.

Summary
Chlorate is reduced with acidic Fe (II) in a known excess. The remainder of the Fe (II) is then titrated with potassium permanganate to Fe (III). The method is applicable for solutions between 200 and 700 g/l. changing the sample volumes will make it suitable for other concentrations.

\[
\text{ClO}_3^- + 6 \text{Fe}^{2+} + 6 \text{H}^+ \rightarrow \text{Cl}^- + 6 \text{Fe}^{3+} + 3 \text{H}_2\text{O}
\]

\[
5 \text{Fe}^{2+} + \text{MnO}_4^- + 8 \text{H}^+ \rightarrow 5 \text{Fe}^{3+} + \text{Mn}^{2+} + 4 \text{H}_2\text{O}
\]

Apparatus
- Titrino 756 or similar
- Redox-elektrode
- Voll-pipettes: 20, 10, 2 ml
- Heating plate
- General lab equipment

Chemicals
- Potassium permanganate, \( \text{KMnO}_4 \) 0.050M
- Iron(II)sulphate, \( \text{FeSO}_4 \) 0.45M in 3M H\(_2\)SO\(_4\) (see additional instructions)
- Mixed acid, \( \text{MnSO}_4 + \text{H}_3\text{PO}_4 + \text{H}_2\text{SO}_4 \) (see additional instructions)
Procedure

Sample preparation
Dilute 10 ml of the feed solution at process temperature to 100 ml in a measuring cylinder, mix well

Analysis
1. Add 20 ml FeSO₄ solution accurately, either by a Voll-pipette, or dosing from a Dosimat or similar equipment to a 200 ml beaker
2. Take 2 ml from the diluted sample to the beaker
3. Add 10 ml Mixed acid
4. Let the sample boil for a minute with glass beads, cool to room temperature
5. Titrate with 0.05M KMnO₄ potentiometric or to a faint pink color manually. Note the amount B
6. Prepare at least 2 Blank samples the same way, and titrate. Calculate the average consumption to the blanks and note the amount A

Calculating and reporting
\[
\text{NaClO}_3(\text{g/dm}^3) = \frac{(A - B) \times C \times M \times 10}{V \times 6 \times 100}
\]

\[\begin{align*}
A & \quad \text{average ml required for the blank titration} \\
B & \quad \text{ml required for the sample titration} \\
C & \quad \text{Concentration of KMnO}_4 \\
M & \quad \text{Molecular weight of NaClO}_3 [106.438] \\
V & \quad \text{Sample volume} \\
5/6 & \quad \text{Molar ratio} \\
10/100 & \quad \text{Dilution factor}
\end{align*}\]

LOQ (limit of quantitation): 25 g/l
Accuracy 2RSD = 1.0%
Waste disposal
To the sink with plenty of water

References
1. Vogel's textbook of quantitative inorganic analysis
2. Chemical Analysis; Herbert Laitinen
3. Standard Methods of chemical analysis; Wilfred Scott

Additional instructions

FeSO₄-solution
Dissolve 125 g FeSO₄ · 7H₂O or 117 g FeSO₄ · 6 H₂O in deionized water, add 180 ml of concentrated H₂SO₄ and dilute to 1000 ml in a measuring cylinder after cooling.

Note: Always add acid to water - never water to acid.

Mixed acid
Dissolve 350 g MnSO₄ in de-ionized water, dilute to approx. 600 ml carefully add 150 ml of concentrated H₃PO₄ and 150 ml of H₂SO₄, dilute to 1000 ml after cooling.

Suggestions for titrino setup
The actual setup is dependent on the machine and type and condition of the electrode, so the following can only be considered as an initial suggestion that might have to be modified.

The method
Separated into two - first a blank determination with an average calculation and then the determination, which which automatically uses the average from the blank titration.
<table>
<thead>
<tr>
<th></th>
<th>Blank</th>
<th>Chlorate determination</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mode</strong></td>
<td>DET</td>
<td>DET</td>
</tr>
<tr>
<td><strong>Min.incr</strong></td>
<td>10μl</td>
<td>10μl</td>
</tr>
<tr>
<td><strong>Signal drift</strong></td>
<td>50 mV/min</td>
<td>50 mV/min</td>
</tr>
<tr>
<td><strong>Equilibr. Time</strong></td>
<td>26 s</td>
<td>26 s</td>
</tr>
<tr>
<td><strong>Start v</strong></td>
<td>38ml</td>
<td>OFF</td>
</tr>
<tr>
<td><strong>Statistics</strong></td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td>n = 2 (3)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Res.tab</strong></td>
<td>original</td>
<td>-</td>
</tr>
<tr>
<td><strong>EPC</strong></td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td><strong>EP recognition</strong></td>
<td>Greatest</td>
<td>Greatest</td>
</tr>
<tr>
<td><strong>Common variables</strong></td>
<td>C30 = MN1</td>
<td>-</td>
</tr>
<tr>
<td><strong>RS1</strong></td>
<td>EP1</td>
<td>EP1</td>
</tr>
<tr>
<td><strong>Chlorate g/l</strong></td>
<td>-</td>
<td>((C30-EP1)\times C01 \times C02 \times C03 \times C04 \times C00 \times C05)</td>
</tr>
<tr>
<td><strong>C01</strong></td>
<td>0.05 (KMnO₄)</td>
<td></td>
</tr>
<tr>
<td><strong>C02</strong></td>
<td>106.43 (Mw)</td>
<td></td>
</tr>
<tr>
<td><strong>C03</strong></td>
<td>5 ( Molar ratio)</td>
<td></td>
</tr>
<tr>
<td><strong>C04</strong></td>
<td>10 ( dilution factor)</td>
<td></td>
</tr>
<tr>
<td><strong>C05</strong></td>
<td>6 ( Molar ratio)</td>
<td></td>
</tr>
</tbody>
</table>
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AkzoNobel Representatives will be pleased to discuss in detail the safe handling, application and benefits of sodium chlorate.

To arrange your personal interview, please contact your AkzoNobel Representative, email bleaching_experts@akzonobel.com or ppcinfo@akzonobel.com or call one of the phone numbers listed below:

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