SUPRA PERFECTA TECHNOLOGIES LIMITED

Effective ▪ Environmentally Friendly ▪ Infection Control

## Executive Summary

- 25% cost reduction of water treatment disinfection stage compared to sodium hypochlorite (Saudi Arabia annual non-agricultural water consumption ~ 3b m3, saving ~ £250m)
- Removal of hazardous transport, storage, and health & safety costs
- Considerable reduction in filter replacement downtime and costs
- Considerable reduction in system maintenance (corrosion and scaling) costs
- Local dilution plant can uniquely adjust both pH (for polyamide filter protection) and conductivity (for ROW @ 75 microsiemens, or for UPW @ 5 microsiemens)
- HOCl starts to degrade after 18 months, NaOCl after 1 month
- Greater antimicrobial efficacy compared to other water treatment chemicals and methodologies
- HOCl is cost effective, non-hazardous, low carbon, and environmentally friendly and highly effective at biofilm prevention and removal.

## Stable Active Halogen Technology HOCl (SAHT)

SPT has the world's only scalable, proprietary manufacturing process producing high purity, stable HOCl in commercially viable volumes. The technology produces "Stable Active Halogen Technology" ("SAHT") which comprises >90% HOCl at 99% purity concentrations ranging from 50 ppm to 32,000 ppm and with a proven shelf-life of over 18 months.

SAHT is a stable active halogen solution. As well as rapidly killing all bacteria, viruses, fungi and spores, it is highly effective in breaking down the biofilms which harbour these pathogens. It is ideal for use in water treatment, hygiene and pipework applications, where it quickly eradicates Legionella, Pseudomonas and other microbes.

Currently in use by the Californian Office of Emergency Services, and Heathrow Airport.

## Water Treatment Process

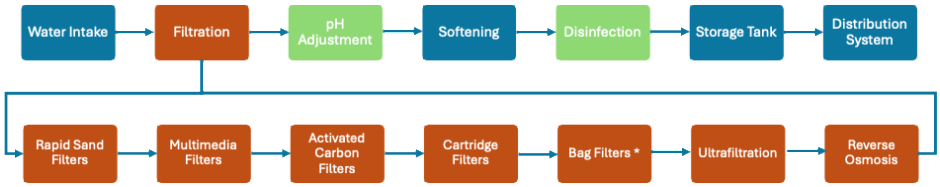


Figure 1 – Water Treatment Process

## Disinfection Cost Comparison - HOCl vs NaOCl

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| HOCl | | Maintenance |
|---|---|---|
| Cost @ 32,000 ppm | litre | £7.50 |
| Dosage | ppm | 1.0 |
| | pH | 6.0 |
| Usage | millilitre | 31.0 |
| Cost per ton | | £0.23 |

| HOCl | | PH Reduction |
|---|---|---|
| HOCl | pH | 6.0 |
| Target | pH | 7.50 |
| Saudi Arabia water average pH is ~ 8, HOCl will reduce this to 7.5 | | |
| Cost per ton | | £0.00 |
| **Total per ton** | | **£0.23** |

| NaOCl | | Maintenance |
|---|---|---|
| Cost @ ~12.5% concentration | litre | £0.70 |
| Dosage | mg/l | 1.5 |
| | pH | 12.25 |
| Usage | grams | 12 |
| Cost per ton | | £0.06 |

| $CO_2$ | | PH Reduction |
|---|---|---|
| NaOCl | pH | 12.25 |
| Target | pH | 7.50 |
| $CO_2$ required to reduce pH | litres | 395 |
| $CO_2$ | kg | 0.776 |
| Liquid $CO_2$ | kg | £0.33 |
| Cost per ton | | £0.26 |
| **Total per ton** | | **£0.31** |

Figure 2 – HOCl vs NaOCl Cost Comparison

## Transport Considerations

| Factor | HOCl | NaOCl |
|---|---|---|
| **Bulk transport** | 32,000 ppm | Common in 5–15% solutions |
| **Hazard class (UN)** | Not classified for transport | UN1791 (Class 8, Corrosive liquid) |
| **Packaging** | IBCs, drums, tankers | IBCs, drums, tankers |
| **Regulatory handling** | Not regulated for transport (made on-site) | Regulated for land/sea transport |
| **Weight-to-dose efficiency** | High (more effective per mg) | Lower, so more volume needed for same kill rate |

## Filter Considerations

| Factor | HOCl | NaOCl |
|---|---|---|
| **Filter replacement frequency** | Low (due to oxidation) | Higher (due to oxidation + high pH) |
| **Membrane lifespan (UF/RO)** | Not sensitive to either | Sensitive to both → neutral dosing |
| **Filter housing wear (metal)** | Low corrosion | Higher corrosion risk |
| **Annual filter maintenance cost** | Lower overall | Higher (due to more degradation) |

## HOCl vs NaOCl Comparison

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| | Hypochlorous Acid | Sodium Hypochlorite |
|---|---|---|
| **Safety and Low Toxicity** | Naturally produced by the human immune system, it is non-toxic, non-irritating, and generally safe for direct skin and eye contact at low concentrations. It can be used safely around people, animals, and food. | Highly caustic, sodium hypochlorite can cause skin, eye, and respiratory irritation. It also releases harmful fumes, especially in poorly ventilated areas, and requires protective gear for safe handling. |
| **Neutral pH and Non-Corrosive Nature** | With a neutral pH, HOCl is non-corrosive to most surfaces and equipment, making it ideal for environments with sensitive materials or electronics. | Highly alkaline, with a pH around 11-13, which can be corrosive to metals, plastics, and textiles over time. Prolonged use can degrade surfaces and damage equipment, requiring more maintenance and replacements. |
| **Greater Antimicrobial Efficacy** | More effective at killing pathogens at lower concentrations compared to sodium hypochlorite due to its higher oxidation potential. HOCl disrupts cell membranes more efficiently, allowing rapid destruction of bacteria, viruses, and spores. | Effective as a disinfectant but often requires higher concentrations and longer contact times to achieve the same results as hypochlorous acid, especially for certain bacteria and spores. |
| **Lower Chlorine Odor** | Has little to no odor, which makes it more pleasant to use, especially in enclosed areas or high-traffic spaces. | Has a strong chlorine smell, which can be overwhelming and unpleasant, especially in areas with limited ventilation. This can also cause respiratory irritation for sensitive individuals. |
| **Environmentally Friendly** | Breaks down into water and mild salt, making it environmentally friendly and safe for disposal without needing special measures. | Degrades to release chlorinated byproducts that can be harmful to aquatic life and contribute to environmental pollution if not disposed of properly. |
| **Application Versatility** | Can be applied in a variety of ways, including through sprays, foggers, and electrostatic sprayers. It's safe enough to be used on hands, as a food-safe sanitizer, and in public areas. | Typically limited to surfaces and less flexible for certain applications due to its caustic nature and potential for skin irritation, making it less suitable for direct or sensitive applications. |
| **Stability and Compatibility** | More stable in solution when properly stored, and compatible with most surfaces, textiles, and devices, especially in lower concentrations. | Has a shorter shelf life, especially when exposed to sunlight or heat, and can degrade quickly. Its compatibility is limited due to its corrosive nature, especially at higher concentrations. |