



On-Site Sodium Hypochlorite Generation Equipment

Water Arabia - 2015

On-Site Sodium Hypochlorite Generation



- Electrolysis

- A Process that decomposes a chemical compound into its elements or produces a new compound by the action of an electrical current. The electrical current is passed through an electrolytic cell and oxidation/reduction reactions occur at the electrodes. E.g., water can be decomposed into hydrogen and oxygen, or a metal can be electroplated by electrolysis.

- Electrolytic Cell

- An electrochemical cell that converts electrical energy into chemical energy. The chemical reactions do not occur "spontaneously" at the electrodes when they are connected through an external circuit. The reaction must be forced by applying an external electrical current. It is used to store electrical energy in chemical form. It is also used to decompose or produce (synthesize) new chemicals by application of electrical power. This process is called electrolysis, e.g., water can be decomposed into hydrogen gas and oxygen gas. The free energy change of the overall cell reaction is positive.

On-Site Sodium Hypochlorite Generation



0.8% or 8,000 mg/L Free Available Chlorine

On-Site Sodium Hypochlorite Generation



- Cl^- = Chloride Ions

- Na^+ = Sodium

- Cl_2 = Chlorine Gas

- H_2 = Hydrogen Gas

- OH^- = Hydroxyl Ions

- e^- = Electricity

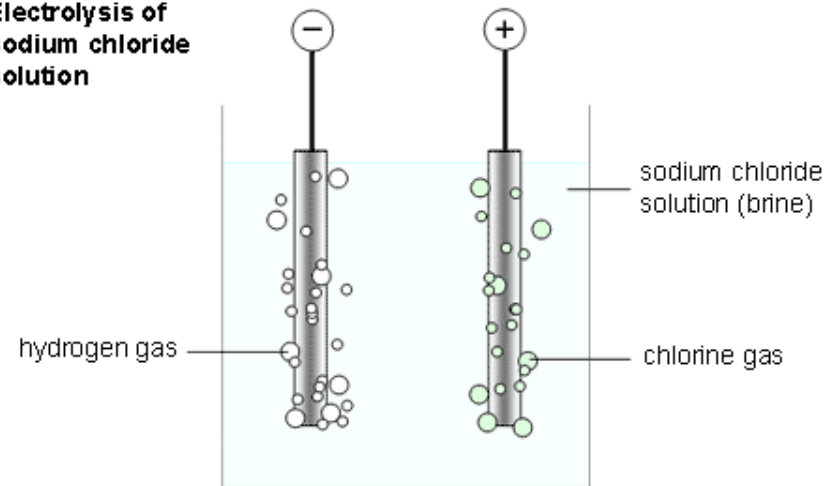
- Cathode (Negative Side):



- Anode (Positive Side)



Electrolysis of sodium chloride solution



On-Site Sodium Hypochlorite Generation



What you need!

- 56.78 Liters Water
- 3 kg Salt
- 4.4 kW Electricity
- $\text{NaCl} + \text{H}_2\text{O} + 2\text{e}^- \longrightarrow \text{NaOCl} + \text{H}_2$
 - 0.45 kg Cl_2
 - 56.78 Gallons Sodium Hypochlorite
 - .8% Concentration (8,000 ppm FAC)
 - 1/16 Kilograms H_2
 - Hydrogen

On-Site Sodium Hypochlorite Generation



Water Quality

	MEASURE	LIMIT	WHAT IS IMPACTED		
			Oxidant Demand	Chlorine Production	Cell Life
Total Hardness**	mg/L	< 17.1 mg/L		✓	✓
	(or grains/gal)	(1 grain/gallon)			
Iron (Fe)**†	mg/L	< 1 mg/L	✓		✓
Manganese (Mn)**	µg/L	< 50 mg/L	✓	✓	✓
Fluoride (F)	mg/L	< 1 mg/L			✓
Silica (SiO ₂)	mg/L	< 80 mg/L		✓	✓
Bromide	mg/L	< 50 mg/L			✓
Cyanide	mg/L	< 1 mg/L			✓
Lead	mg/L	< 2 mg/L			✓
Dissolved Sulfides (as H ₂ S)	mg/L	***	✓		
Ammonia Nitrogen (NH ₃ -N)	mg/L	***	✓		
Organic Nitrogen (Org - N)	mg/L	***	✓		
Total Organic Carbon (TOC)	mg/L	***	✓		
pH	-	5-9		✓	✓
Water Temperature Range	°C	> 4.4°C < 35°C****		✓	✓
	°F	> 40°F < 95°F****			

On-Site Sodium Hypochlorite Generation



Food Grade Quality salt is recommended

Component	Percent Minimum
NaCl (dry)	99.5%
Impurity	Percent Maximum
Calcium (in all forms)	0.01%
Magnesium (in all forms)	0.01%
Manganese	0.00002%
Iron (as Fe)	0.0005%
Insolubles	0.005%
Additives	0.0001%

These are not “hard specifications”. However, the maintenance required for the filters and electrolytic cell are dependent on salt and water quality.

On-Site Sodium Hypochlorite Generation



Recommended Feed Water Temperature

- 10 °C to 26.7 °C
- Salt Usage at these ranges
 - 3 kg salt/kg FAC
- Power Usage at these ranges
 - 2 kW-hr/lb FAC (4.4 kW-hr/kg FAC)

On-Site Sodium Hypochlorite Generation



Allowable Feed Water Temperature (Low)

- 4.4 °C to 10 °C
- Salt Usage will go up ~25%
 - 3.75 kg salt/kg FAC
- Power Usage will go down ~10%
 - 3.96 kW-hr/kg FAC

On-Site Sodium Hypochlorite Generation

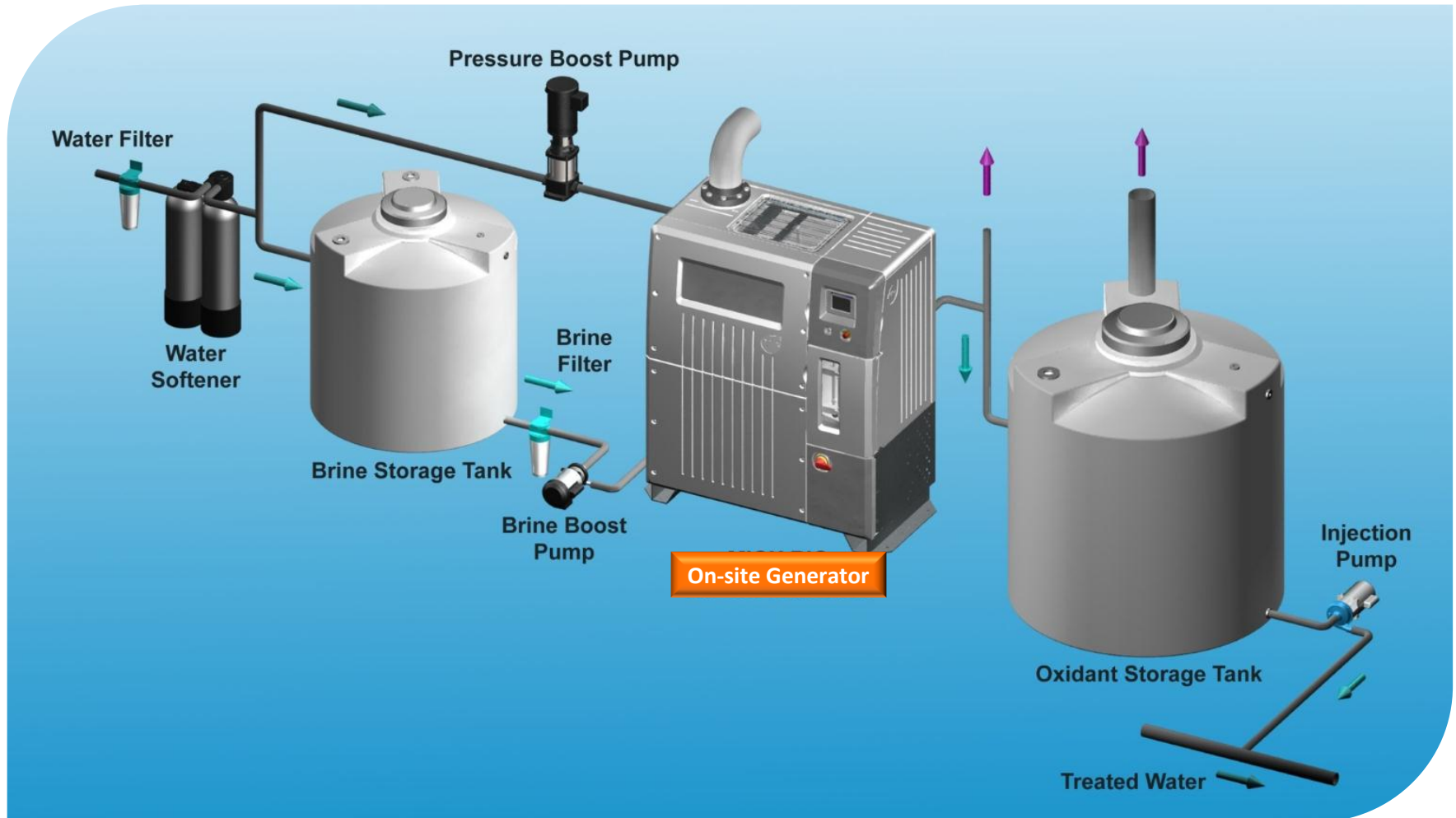


Allowable Feed Water Temperature (High)

- 80 °F (26.7 °C) to 95 °F (35.56 °C)
- Salt Usage will go down ~10%
 - 2.7 kg salt/kg FAC
- Power Usage will go up ~15%
 - 5.06 kW-hr/kg FAC

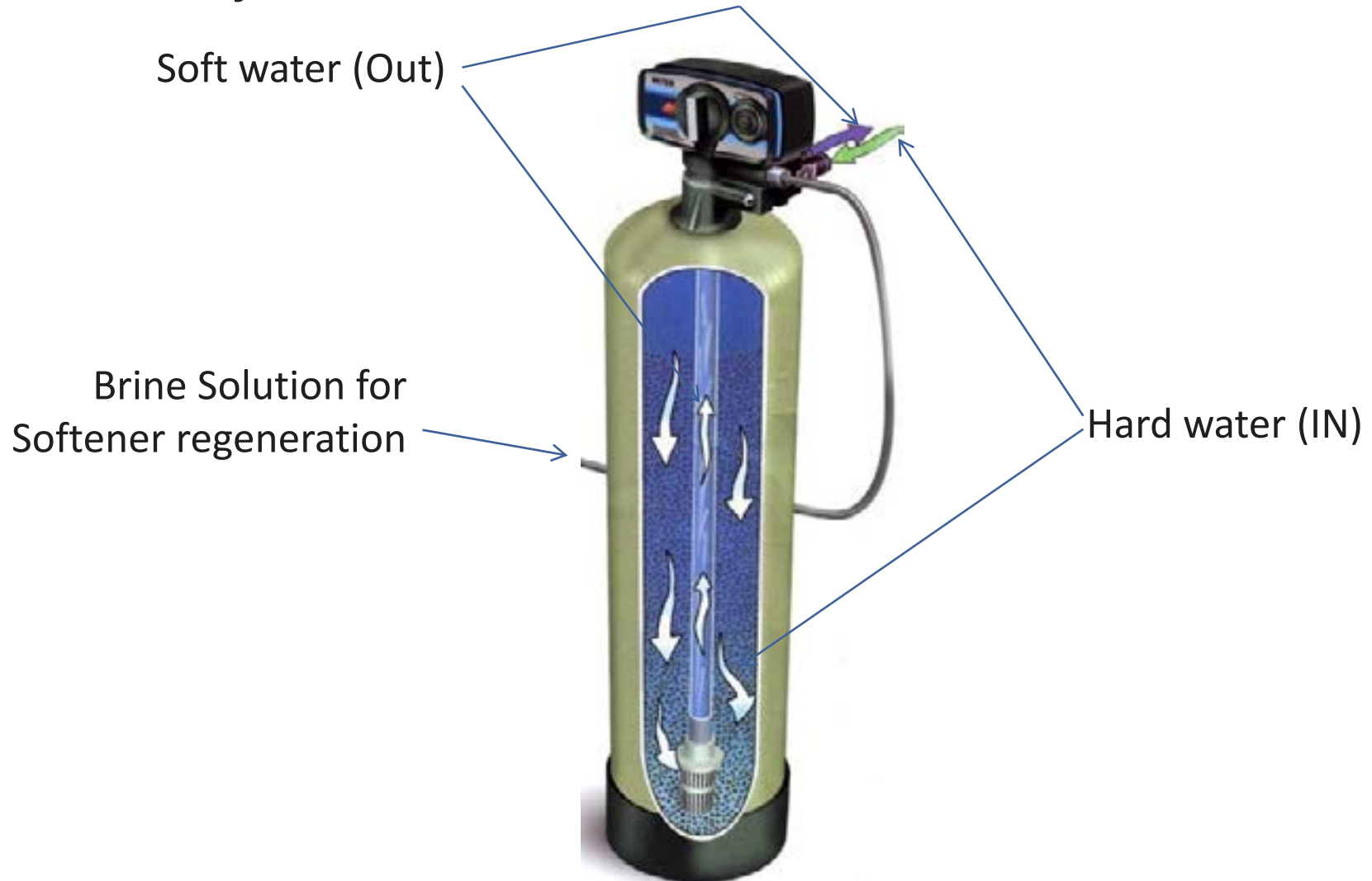
On-Site Sodium Hypochlorite Generation

Generation Process



On-Site Sodium Hypochlorite Generation

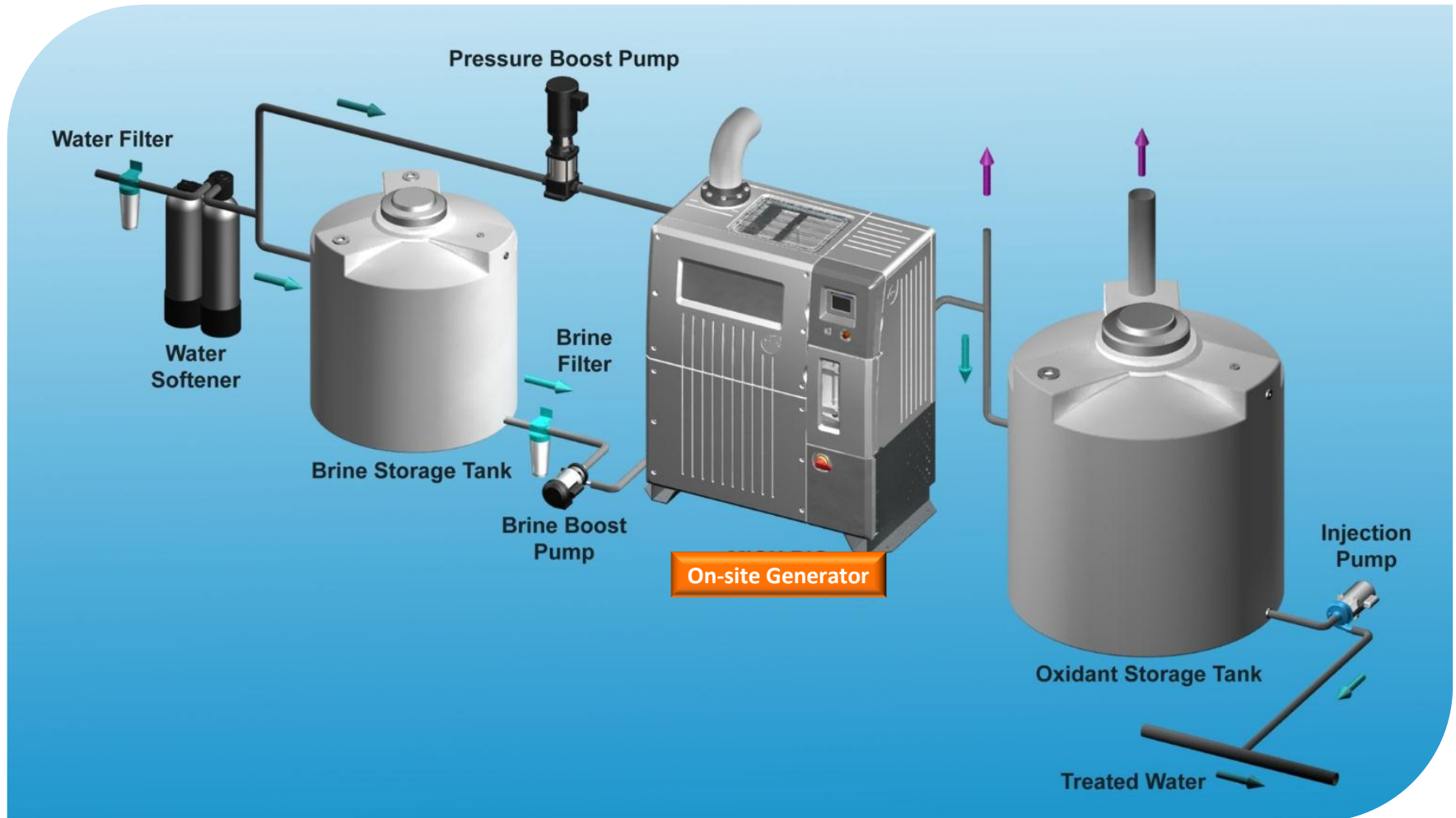
Water Softener



Water softener

On-Site Sodium Hypochlorite Generation

Generation Process



On-Site Sodium Hypochlorite Generation

Brine Saturators



1. Liquid Level Controls
2. Salt Fill Spout
3. Vent with Dust Bag
4. Access Manways

°F	°C	% Salt
40	4.44	26.33
50	10	26.36
60	15.56	26.395
70	21.11	26.45
80	26.67	26.52
100	37.78	26.68

SpGr. @ 60 F	1.2024
--------------	--------

Question & Answers

Thank You



Randy Otts

Product Manager – Disinfection

rotts@Parkson.com

(954) 288-8475

www.parkson.com