PRODUCT PROFILE

Sodium Hypochlorite

NaOCl

Strength of Solutions

Sodium hypochlorite can be expressed in several common ways in various industries and may cause confusion to users from a different industry. The objective of this Product Profile is to provide an explanation of the most common terms when referring to the strength. All terms can be converted to each other using the formulas provided.

Weight percent of sodium hypochlorite:
The weight percent of sodium hypochlorite is the weight of the sodium hypochlorite per 100 parts by weight of bleach solution.

$$\text{Weight percent of sodium hypochlorite} = \frac{\text{GPL available chlorine} \times 1.05}{10 \times (\text{specific gravity of solution})}$$

Weight percent of available chlorine:
The weight of available chlorine per 100 parts by weight of sodium hypochlorite solution. The term “available chlorine” refers to the amount of chlorine equivalent to hypochlorite. It is a measure of strength and bleaching power and, in one or another of its related units of measurement, denotes the concentration of the bleach solution.

$$\text{Weight percent available chlorine} = \frac{\text{GPL available chlorine}}{10 \times (\text{specific gravity of solution})}$$

$$\text{Weight percent available chlorine} = \frac{\text{Trade percent available chlorine}}{(\text{specific gravity of solution})}$$

Trade percent of available chlorine:
A term often used to define the strength of commercial bleaches. It is identical to grams per liter of available chlorine except the unit of volume is 100 milliliters not one liter. Therefore, the result is one tenth of the grams per liter.

$$\text{Trade percent available chlorine} = \frac{\text{GPL available chlorine}}{10}$$

Information obtained from:
Handbook of Chlorination (1972), New York: Van Norstrand Reinhold Company

Approximate Freezing Points of Sodium Hypochlorite Solutions

Sodium hypochlorite solutions will freeze at different temperatures depending upon the strength. Freezing is accompanied by expansion that can damage equipment. However, the solutions can be thawed without impact on quality. Under some conditions (especially for solutions above 10% sodium hypochlorite), freezing of sodium hypochlorite solutions may result in precipitation of sodium chloride. If solids do precipitate, care should be taken to prevent interruption of operations or damage to handling equipment.

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Approximate Freezing Points of Sodium Hypochlorite Solutions		
Weight Percent NaOCl	**Freezing Point (°F)**	**Freezing Point (°C)**
4	24.0	-4.4
6	18.5	-7.5
8	17.0	-10.0
10	7.0	-13.9
12	-3.0	-19.4
14	-14.0	-25.6

Dangerous Reactions of Sodium Hypochlorite

Sodium hypochlorite in aqueous solutions will react and produce the same results as elemental chlorine in aqueous solutions as long as the concentration of available chlorine, the temperature, and the pH are the same. Unlike elemental chlorine, sodium hypochlorite adds alkalinity to the solution. Elemental chlorine removes alkalinity. This can be very important in the destruction of cyanides or sulfides where acidic conditions could release a toxic hydrogen gas or hydrogen sulfide gas.

Reactions with acids
Sodium hypochlorite solutions must not be mixed with acids. Excess acidity will enable the hypochlorite ion to form chlorine gas and evolve from the solution. A serious chlorine release can result.

Reaction with ammonia compounds
Sodium hypochlorite solutions must never be mixed with any ammonia solutions or solids or solutions containing ammonia salts such as those found in many common household cleaners. Both toxic and hazardous gases can be formed.

Reactions with organic compounds
Solutions of sodium hypochlorite may react violently with many organic compounds including greases, oils, fuels, etc.

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