

DILUTED SODIUM HYPOCHLORITE - CORRELATION BETWEEN VARIOUS CONCENTRATION UNITS

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Sodium Hypochlorite is manufactured by exothermal absorption of gaseous Chlorine in an aqueous solution of Caustic Soda, according to:



Production of Sodium Hypochlorite (NaClO) is therefore inevitably linked to the production of an equimolar quantity of Sodium Chloride (NaCl).

Furthermore, a minimal excess of Caustic Soda (NaOH) is necessary to maintain a minimal pH (pH > 11) so as to guarantee stability of Sodium Hypochlorite.

A Sodium Hypochlorite solution is a mixture of several chemical ingredients whose composition depends on the following factors: concentration of initial Caustic Soda, concentration of Sodium Hypochlorite, manufacturing process.

These are the typical units to express the concentration of a Sodium Hypochlorite solution:

- “% Sodium Hypochlorite” (w/w)
- “% Active Chlorine” (w/v)
- “g/l Active Chlorine” (grams of Active Chlorine/litre of Sodium Hypochlorite solution)

Conversion from w/w to w/v concentration needs to consider Density.

Taking into account that a Sodium Hypochlorite solution is a mixture of several chemical compounds and that the solutions which are usually available have several concentrations of Active Chlorine, the relevant density of such solutions can vary depending on the quality of Sodium Hypochlorite.

The following table shows data concerning different diluted solutions.

The relationship amongst the three typical units and Density is shown.

The Density data have to be considered as “average values”, because this kind of parameter may vary depending on the Hypochlorite composition.

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% Active Chlorine (w/w)	% NaClO (w/w)	Average Density	Active Chlorine (g/l)	% Active Chlorine (w/w)	% NaClO (w/w)	Average Density	Active Chlorine (g/l)
1,0	1,05	1,014	10,14	9,7	10,19	1,153	111,84
1,2	1,26	1,017	12,20	9,9	10,40	1,157	114,54
1,3	1,37	1,018	13,23	10,0	10,50	1,159	115,90
1,5	1,58	1,021	15,32	12,5	13,13	1,21	151,25
1,6	1,68	1,022	16,35	12,6	13,23	1,21	152,46
1,7	1,79	1,024	17,41	12,7	13,34	1,21	153,67
1,8	1,89	1,025	18,45	12,8	13,44	1,21	154,88
1,9	2,00	1,027	19,51	12,9	13,55	1,21	156,09
2,0	2,10	1,028	20,56	13,0	13,65	1,21	157,30
2,1	2,21	1,03	21,63	13,1	13,76	1,21	158,51
2,2	2,31	1,031	22,68	13,3	13,97	1,218	161,99
2,3	2,42	1,033	23,76	13,4	14,07	1,218	163,21
2,4	2,52	1,034	24,82	13,5	14,18	1,218	164,43
2,5	2,63	1,036	25,90	13,6	14,28	1,225	166,60
2,6	2,73	1,037	26,96	13,7	14,39	1,225	167,83
2,7	2,84	1,038	28,03	13,8	14,49	1,234	170,29
2,8	2,94	1,04	29,12	13,9	14,60	1,234	171,53
2,9	3,05	1,041	30,19	14,0	14,70	1,234	172,76
3,0	3,15	1,043	31,29	14,1	14,81	1,234	173,99
3,5	3,68	1,05	36,75	14,2	14,91	1,242	176,36
4,5	4,73	1,066	47,97	14,3	15,02	1,242	177,61
5,0	5,25	1,074	53,70	14,4	15,12	1,242	178,85
5,5	5,78	1,082	59,51	14,5	15,23	1,242	180,09
6,0	6,30	1,09	65,40	14,6	15,33	1,242	181,33
6,5	6,83	1,098	71,37	14,7	15,44	1,242	182,57
7,0	7,35	1,106	77,42	14,8	15,54	1,242	183,82
7,5	7,88	1,115	83,63	14,9	15,65	1,243	185,21
8,0	8,40	1,123	89,84	15,0	15,75	1,243	186,45
8,5	8,93	1,132	96,22	15,1	15,86	1,243	187,69
8,6	9,03	1,134	97,52	15,2	15,96	1,244	189,09
8,7	9,14	1,135	98,75	15,3	16,07	1,244	190,33
8,9	9,35	1,139	101,37	15,4	16,17	1,244	191,58
9,0	9,45	1,141	102,69	15,5	16,28	1,244	192,82
9,1	9,56	1,143	104,01	15,6	16,38	1,244	194,06
9,2	9,66	1,144	105,25	15,7	16,49	1,244	195,31
9,3	9,77	1,146	106,58	15,8	16,59	1,244	196,55
9,4	9,87	1,148	107,91	15,9	16,70	1,244	197,80
9,5	9,98	1,15	109,25	16,0	16,80	1,244	199,04

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Calculations for unit conversion

Conversion from % Active Chlorine (w/w) to g/l Active Chlorine

$$\text{g/l Active Chlorine} = A \times B \times 10$$

whereas:

- A = Sodium Hypochlorite concentration as “% Active Chlorine” (w/w)
B = Density
10 = % / g/l ratio

Conversion from % Active Chlorine (w/w) to % Sodium Hypochlorite (w/w)

$$\% \text{ Sodium Hypochlorite} = A \times 74,45 / 71$$

whereas:

- A = Sodium Hypochlorite concentration as “% Active Chlorine” (w/w)
74,45 = Sodium Hypochlorite (NaClO) Molecular Weight
71 = Chlorine (Cl₂) Molecular Weight

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