

Answer on Question #64681, Chemistry / General Chemistry

How to calculate the concentration of free chlorine when 0.3ml of 5% NaOCl is added in 300 ml distilled water?

Solution:

The concentration of "free chlorine" mg / ml, calculated using the formula:

$$C_{Cl} = \frac{C_{NaOCl} \times V_{NaOCl} \times M_E(Cl_2)}{V_{H_2O}}$$

Where,

C_{Cl} - the concentration of chlorine (mg / ml);

C_{NaOCl} - the concentration of NaOCl (mol / ml);

M_E – molar mass equivalent chlorine, $M_E(Cl_2) = 35,45$ (g / mol);

V_{NaOCl} – NaOCl volume, ml;

V_{H_2O} - water volume, ml.

We turn to the mass fraction molarity:

$$C_{NaOCl} = \frac{1000\rho\omega}{M}$$

Where,

ρ - density of the solution in g / ml;

ω - mass fraction of the solute;

M - molar mass of the solute, g / mol. $M(NaOCl) = 75$ g/mol.

$$C_{NaOCl} = \frac{1000 \times 1.11 \frac{g}{ml} \times 0.05}{74.44 \frac{g}{mol}} = 0.75 \text{ mol/ml}$$

Finally,

$$C_{Cl} = \frac{0.75 \frac{mol}{ml} \times 0.3ml \times 35.45 \text{ g/mol}}{300 \text{ ml}} = 26 \text{ mg/ml}$$

Answer: 26 mg/ml

Answer provided by <https://www.AssignmentExpert.com>