PARTS PER MILLION

ppm conversions

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On this page:
PPM conversion values and serial dilutions:
How to dilute and calculate ppm concentrations and volumes,
and how to convert ppm to molarity and percentage amounts.

ppm = parts per million

grams/milliliter = g/ml = milligrams/microliter = mg/ul
1ug /ml = 1mg/l = 1ppm
ppm = ug/g =ug/ml = ng/mg = pg/ug = 10^{-6}
ppm = mg/litres of water

1 g / 1000ml = 1000 ppm

PPB = Parts per billion = ng/g = ng/ml = pg/mg = 10^{-9}

Making up 1000 ppm solutions

1. From the pure metal : weigh out accurately 1.000g of metal, dissolve in 1 : 1 conc. nitric or hydrochloric acid, and make up to the mark in 1 liter volume deionised water.

2. From a salt of the metal :
e.g. Make a 1000 ppm standard of Na using the salt NaCl.

FW of salt = 58.44g.
At. wt. of Na = 23
1g Na in relation to FW of salt = 58.44 / 23 = 2.542g.
Hence, weigh out 2.542g NaCl and dissolve in 1 liter volume to make a 1000 ppm Na standard.

3. From an acidic radical of the salt :
e.g. Make a 1000 ppm phosphate standard using the salt KH_2PO_4

FW of salt = 136.09
FW of radical PO_4 = 95
1g PO_4 in relation to FW of salt = 136.09 / 95 = 1.432g.
Hence, weigh out 1.432g KH_2PO_4 and dissolve in 1 liter volume to make a 1000 ppm PO_4 standard.
Click this link for Atomic absorption standards

Dilutions

Dilution Formula = M1V1 = M2V2
req is the required value you want.

$$\frac{\text{req ppm} \times \text{req vol}}{\text{stock}} = \text{no of mls for req vol}$$

e.g. Make up 50 mls vol of 25 ppm from 100 ppm

25 x 50 / 100 = 12.5 mls. i.e. 12.5 mls of 100 ppm in 50 ml volume will give a 25 ppm solution

Serial dilutions

Making up 10^{-1} M to 10^{-5} M solutions from a 1M stock solution.

Pipette 10 ml of the 1M stock into a 100 ml volumetric flask and make up to the mark to give a 10^{-1} M soln.
Now, pipette 10 ml of this 10^{-1} M soln. into another 100 ml flask and make up to the mark to give a 10^{-2} M soln.
Pipette again, 10 ml of this 10^{-2} M soln. into yet another 100 ml flask and make up to mark to give a 10^{-3} M soln.
Pipette a 10 ml of this 10^{-3} M soln. into another 100 ml flask and make up to mark to give a 10^{-4} M soln.
And from this 10^{-4} M soln. pipette 10 ml into a 100 ml flask and make up to mark to give a final 10^{-5} M solution.

Molarity to ppm

e.g. What is the ppm concentration of calcium in 0.01M $CaCO_3$

At. Wt. of Ca = 40 and 1M = 40 x 1000 = 40,000ppm.

Hence, 0.01M soln = 40,000 x 0.01 = 400 ppm.

The FW of an ion species is equal to its concentration in ppm at 10^{-3}M. Fluoride has a FW of 19, hence a 10^{-3}M concentration is equal to 19ppm, 1M is equal to 19,000 ppm and 1ppm is equal to 5.2 x 10^{-5}M.
Go here for **ISE molarity/ppm conversions**

Ppm (parts per million) to % (parts per hundred)

Example:

1 ppm = 1/1,000,000 = 0.000001 = 0.0001%
10 ppm = 10/1,000,000 = 0.00001 = 0.001%
100 ppm = 100/1,000,000 = 0.0001 = 0.01%
200 ppn = 200/1,000,000 = 0.0002 = 0.02%
5000 ppm = 5000/1,000,000 = 0.005 = 0.5%
10,000 ppm = 10000/1,000,000 = 0.01 = 1.0%
20,000 ppm = 20000/1,000,000 = 0.02 = 2.0%

(Parts per hundred) % to ppm

Example:

0.01% = 0.0001
0.0001 x 1,000,000 = 100 ppm

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