



Technical Note #102

Pipeline Conversions

In reading Gastec Detector Tubes in a pipeline application, it may be desired to convert the result from the concentration units marked on the scale of the tube to different units.

Key

g/mole	=	grams per mole
L/mole	=	liters per mole
lb/MMCF	=	pounds per million cubic feet
mg/L	=	milligrams per liter
mg/m ³	=	milligrams per cubic meter
mw	=	molecular weight
ppm	=	parts per million
SCF	=	standard cubic foot

Equivalentents

1 cubic meter	=	1,000 liters
1%	=	10,000 ppm
1 mole	=	1.02 X 10 ²⁶ atoms
1 molar volume (of a gas)	=	24.45 liters (at 25°C, 760 torr)
mw	=	34.05 grams per mole

Helpful Formulas

Hydrogen Sulfide

1 ppm	=	1.39 mg/m ³
1.39 mg/m ³	=	0.06 grains / 100 SCF
1 grain / 100 SCF	=	16.5 ppm

Water Vapor

1 mg/L	=	62.3 lb/MMCF
1 lb/MMCF	=	21.8 ppm

For any gas or vapor

$$\text{mg/m}^3 \text{ (at 25°C, 760 torr)} = \text{ppm} \times \frac{\text{mw}}{24.45}$$

Example 1

If the water concentration was measured to be 7 pounds per MMCF, what would the measurement be in ppm?

$$7 \text{ lbs / MMCF} \times \frac{21.8 \text{ ppm}}{1 \text{ lb / MMCF}} = 152.6 \text{ ppm}$$

Example 2

If the water concentration was 1.5 milligrams per liter, what would it be in ppm?

$$1.5 \text{ mg / L} \times \frac{62.3 \text{ lb / MMCF}}{1 \text{ mg / L}} = 93.45 \text{ lb / MMCF}$$

$$93.45 \text{ lb / MMCF} \times \frac{21.8 \text{ ppm}}{1 \text{ lb / MMCF}} = 2,037.2 \text{ ppm}$$

Example 3

If the hydrogen sulfide concentration was 4.5 milligrams per cubic meter, what would it be in ppm?

$$4.5 \text{ mg/m}^3 \times \frac{24.45 \text{ L/mole}}{34.08 \text{ g/mole}} = 3 \text{ ppm}$$

Example 4

If the hydrogen sulfide concentration was measured to be 10 parts per million, what would the measurement be in milligrams per liter?

$$10 \text{ ppm} \times \frac{34.08 \text{ g/mole}}{24.45 \text{ L/mole}} = 14 \text{ mg/m}^3$$

$$14 \text{ mg/m}^3 \times \frac{1 \text{ m}^3}{1000 \text{ L}} = 0.014 \text{ mg/L}$$



Also helpful in working with Gastec Tube No. 6LP is the Methanol Correction Slide Card, available by calling Nextteq at the number below or emailing Nextteq at info@nextteq.com. This handy slide card shows the user how to correct for the presence of methanol in natural gas pipelines, which can cause water vapor/dew point readings to read high.