

TO CALCULATE MOLARITY OF A SOLUTION WHEN ONLY LIMITED INFORMATION IS GIVEN ON LABEL

Known: gram-molecular weight % purity

Example: For HCL stock concentrate

Known - 36.5 gram molec. weight HCl  
- 1.191 = specific gravity relative to H<sub>2</sub>O  
- 37.8% purity

$$\begin{aligned} & .378 \quad \quad \quad \} \\ & \times 1.191 \text{ unitless} \} \times 1 \text{ gm/ml H}_2\text{O} \\ & \underline{.4498 \text{ g/ml}} = x \text{ molarity} \\ & .4498 \text{ g/ml} = 449.8 \text{ g in one liter (decimal point change)} \end{aligned}$$

$$\frac{449.8 \text{ (total g/liter)}}{36.5 \text{ (m.w.)}} = 12.4 \text{ molar}$$

$$36.5 \text{ gm/L} = 1 \text{ M}$$

$$449.8 \text{ g/L} = 12.4 \text{ molar}$$

Explanation:

Specific gravity = g/cc or gm/ml and is defined as the ratio of the density of a substance to the density of water at its maximum density (1 gm/ml at 4°C and 760 mmHg).

Therefore, multiplying the % purity x specific gravity = actual conc. of HCl in gm/ml. Converting the figure to grams/liter and dividing by molecular weight of HCl (in the above example) = molarity.