#79998 Chemistry, Other

If density of 3 M NaCl solution is 1.25 g/ml, then what is molality of it?

Answer:

3 Molar solution means there are 3 moles of NaCl in 1 L.
M (Na Cl) = 58.44 g/mole
In 1 liter of water there is: m (NaCl) = 3 x 58.44 = 175.32 g.

$\rho = m/V$
Mass of 1 liter of solution = 1.25 g/ml x 1000 ml = 1,250 g
$m_{solution} = m_{solvent} + m_{solute}$
m (H_2O) = 1,250 – 175,32 = 1,074.68 g
So 1,074.68 ml or 1, 074.68 g of water is mixed with 3 moles of NaCl to make the 3 M solution.

Molality = mass of solute in number of moles / mass of solvent in kg
Cm (NaCl) = 3 / 1.07 kg = 2.79 m