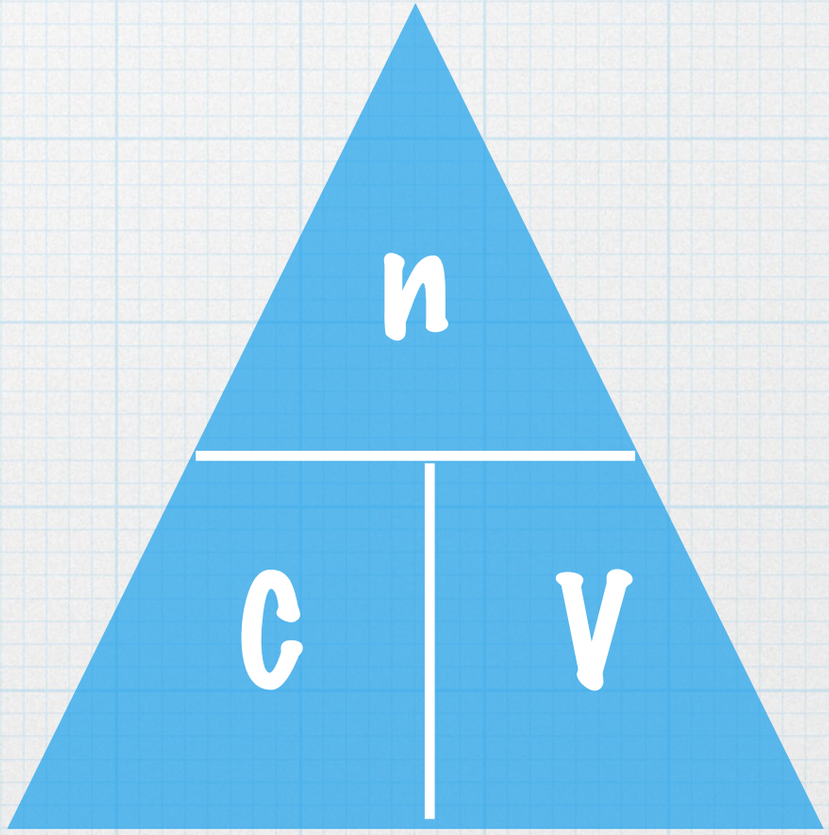
Concentration

* Concentration is more expressed as the molar concentration (C).

* Molar concentration is the amount of solute, in moles, that is dissolved in one litre of solution.

Concentration: $\frac{\text{amount of solute (n)}}{\text{volume of solution (L)}}$ OR $C = n/V$

* C= Concentrations (mol/L or M)
* n= # of moles (mol)
* L= Volume (L)



Example

* A NaOH solution contains 0.186 mol of NaOH in 250mL of solution. Calculate the concentration.

Solution

Given:

$n = 0.186$ mol

$V = 250$ mL

Solution

Given:

$n = 0.186$ mol

$V = 250$ mL

Volume always has to be in L.
To convert to L, divide by 1000.

Solution

Given:

n = 0.186 mol

V = 250 mL / 1000 = .250 L

Solution

Given:

n = 0.186 mol

V = 250 mL / 1000 = .250 L

* C= n/V

Solution

Given:

n = 0.186 mol

V = 250 mL / 1000 = .250 L

* C= n/V

C= 0.186 mol/ .250 L

C= 0.744 mol/L

Therefore he concentration is 0.744 mol/L or M

Example

* A solution is prepared by dissolving 1.68g of copper (II) sulfate, $CuSO_{4(s)}$, in 150 mL pf water. Calculate the concentration of the copper (II) sulphate solution. The molar mass of copper (II) sulfate is 159.6 g/mol.

Solution

Given:

V = 150mL

m = 1.68g

Solution

Given:

V = 150mL / 1000 = .150 L

m = 1.68g

Solution

Given:

V = 150mL / 1000 = .150 L

m = 1.68g

The unit of concentration in mol/L, must convert to mol.

Solution

$n = m/M$

Given:

$m = 1.68\ g$

$M = 159.6\ g/mol$

Solution

n= m/M

Given:

m= 1.68 g

M= 159.6 g/mol

n= 1.68/159.6

n= =0.0105 mol $CuSO_4$

Solution

C=n/v

Given

n= 0.015 mol

V= 0.150 L

Solution

C=n/v

Given

n= 0.015 mol

V= 0.150 L

C=0.0105 mol/. 0.150 L

C=0.0700 mol/L

Solution

C=n/v

Given

n= 0.015 mol

V= 0.150 L

C=0.0105 mol/. 0.150 L

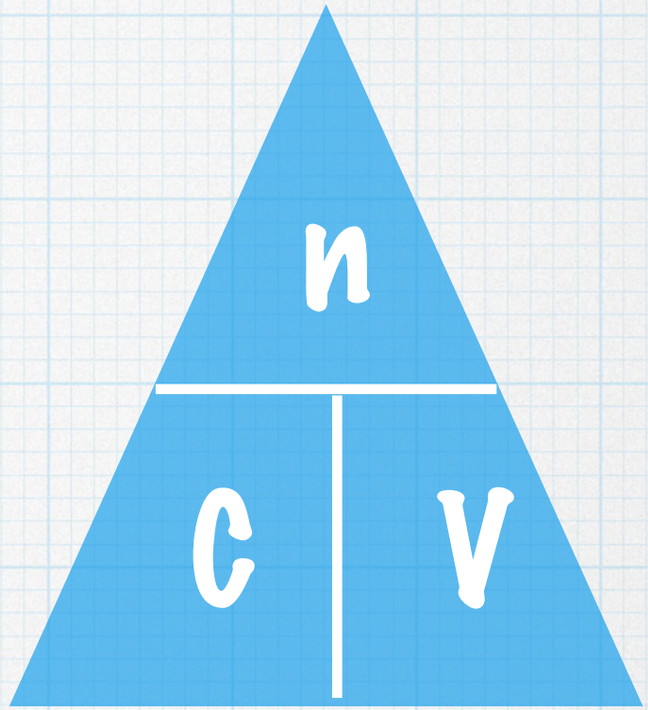
C=0.0700 mol/L

Therefore the concentration in 0.0700 mol/L or M

Example

* $NH_{3(aq)}$ has a molar concentration of 14.8 mol/L. How many moles of ammonia is present in a 1.50 L bottle?

Solution

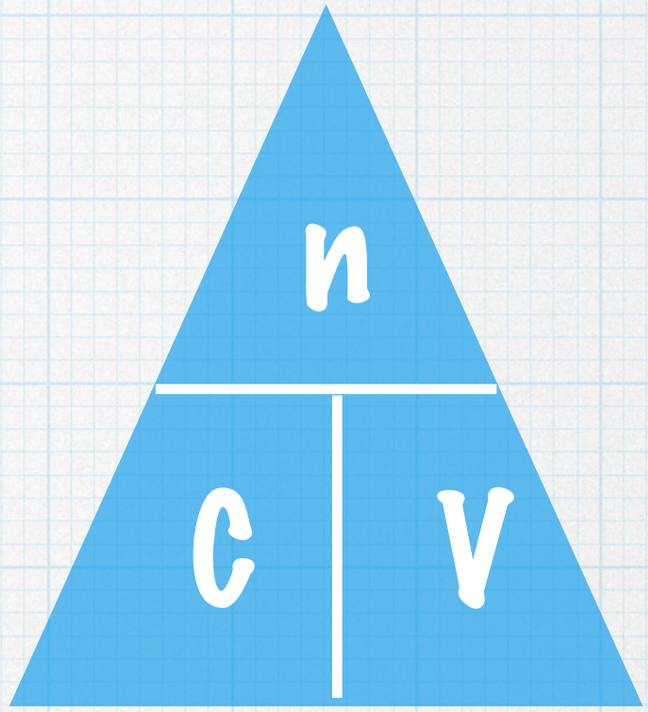


Given

C= 14.8 mol/L

V = 1.5 L

Solution



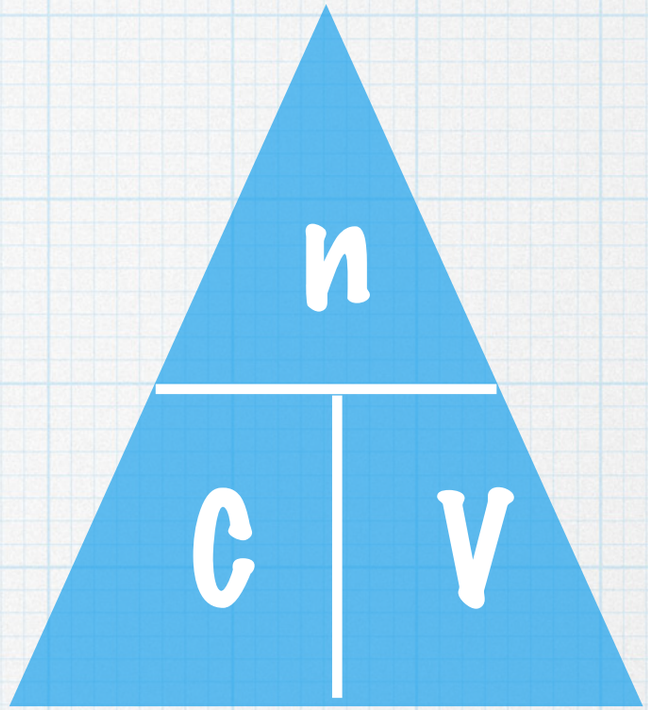
Given

C= 14.8 mol/L

V = 1.5 L

n= C x V

Solution



Given

C= 14.8 mol/L

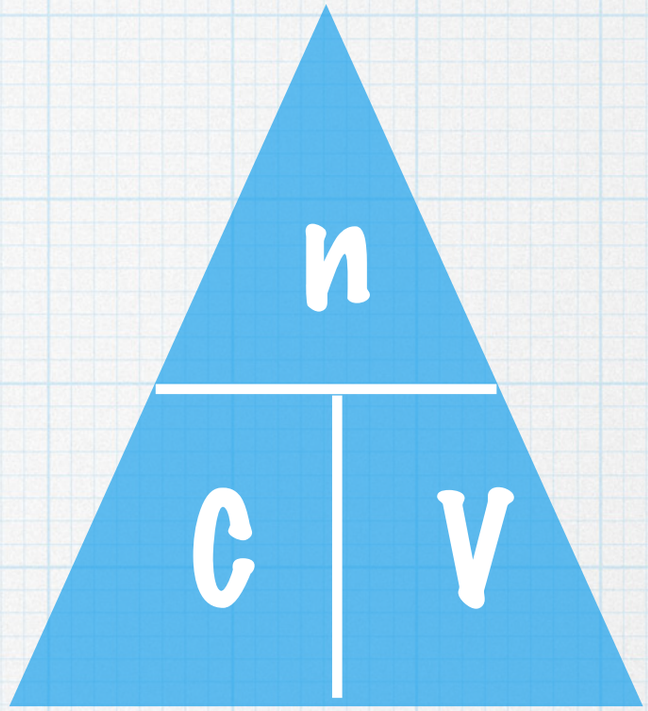
V = 1.5 L

n= C x V

n= 14.8 x 1.5

n= 22.2 mol

Solution



Given

C= 14.8 mol/L

V = 1.5 L

n= C x V

n= 14.8 x 1.5

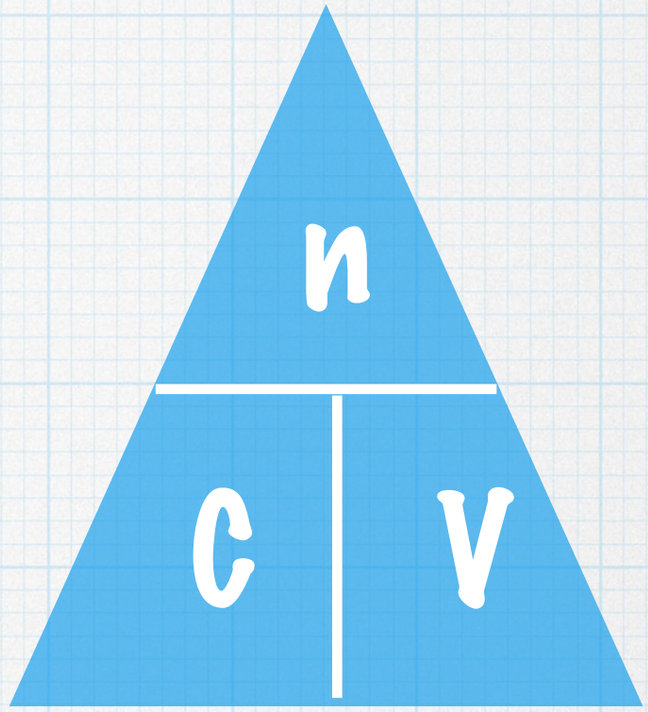
n= 22.2 mol

Therefore there are 22.2 mol of NH_3.

Example

* What volume of a 5.0 mol/L glucose solution $C_6H_{12}O_6$ contains 2.5 mol of glucose?

Solution



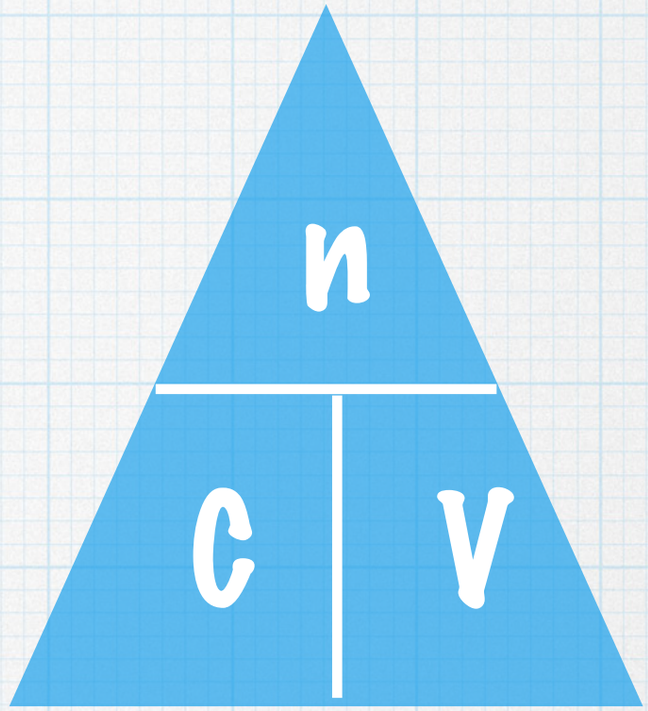
Given

C= 5.0 mol/L

n = 2.5 mol

V= n/C

Solution



Given

C= 5.0 mol/L

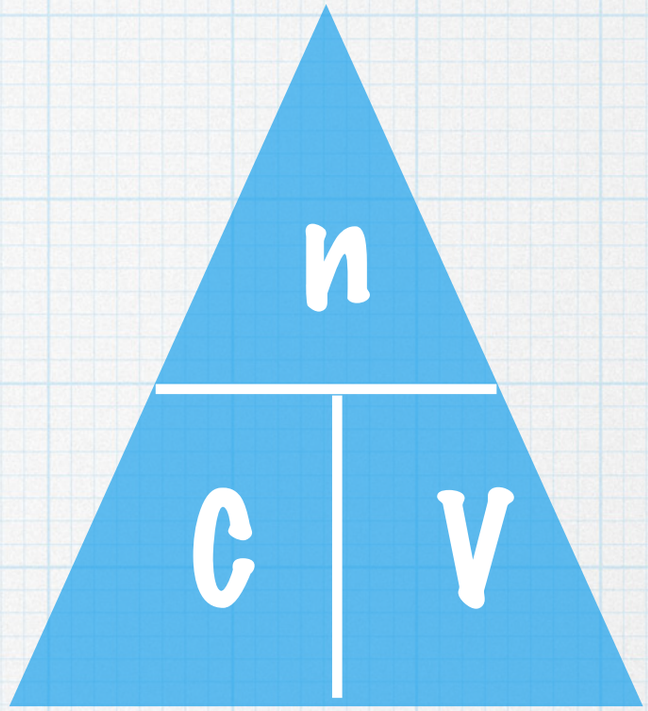
n = 2.5 mol

V= n/C

V= 2.5 / 5.0

V= 0.500 L

Solution



Given

C= 5.0 mol/L

n = 2.5 mol

V= n/C

V= 2.5 / 5.0

V= 0.500 L

Therefore there is 0.500 L of solution.