

## Answer on Question #53426 – Chemistry – General chemistry

### Question:

A sample of municipal water contains one part of urea per millions parts of water by weight. the number of urea molecules in a drop of water of volume 0.05ml is

### Answer:

Taking into account that 1 ppm means 1 mg urea is in 1000 g of water, the mass of urea in 0.05 g equals:

$$m = 1 \text{ mg} \times 0.05 \text{ g} / (1000 \text{ g}) = 5 \times 10^{-8} \text{ g}.$$

Then the number of moles for urea is defined by the equation:

$$v = m/M_w, \text{ where } m - \text{mass of urea and } M_w - \text{molecular weight of urea being of } 60 \text{ g/mol}.$$

$$\text{Thus, } v = 5 \times 10^{-8} \text{ g} / 60 \text{ g mol}^{-1} = 0.08333 \times 10^{-8} \text{ mole}$$

The number of urea molecules equals:

$$N = v \times N_a, \text{ where } N_a - \text{the Avogadro constant } (6.02 \times 10^{23} \text{ mole}^{-1})$$

$$N = 0.08333 \times 10^{-8} \text{ mole} \times 6.02 \times 10^{23} \text{ mole}^{-1} = \mathbf{0.502 \times 10^{15}}$$