The Avogadro number is only a physical constant.

Very exactly, it is the number of molecules in a molecule-gram of a molecular compound.

Avogadro number in context with homeopathy has to be avoided

due to 4 reasons

- real concentration of different substances in an aqueous solution
- impurities of water
- cancelled in calculation
- statistics

Real concentration of different substances in an aqueous solution:
For example:
Water: molecular mass = 16+2 = 18 (1 oxygen plus two hydrogen atoms). Consequently, 18 grams of water contain 6 x10^{23} molecules
Saccharose ($C_6H_{12}O_6$): molecular mass = 72+12+96 = 180.
180 grams of sugar contain 6x10^{23} molecules.

In case of a dilution like *Atropa bella-donna*, the different pharmacologically active ingredients include Hyoscyamine ($C_{17}H_{23}NO_3$), Scopolamine ($C_{17}H_{21}NO_4$), but also some important ingredients like Flavanoids…

In Pharmacy or Pharmacognosy we are observing mostly active substances - such as Atropine or Scopolamine. Sometimes we are forgetting the importance of the so called "secondary ingredients" such as Saponins.

Saponins are so named because they are observed as soapy foam when shaking starting materials with water. Accordingly, there is also a general mode of these compounds, which we are describing with the property of detergents.

Therefore the interactions between different compounds of a dilution have to be observed.

Impurities of water:
100 % pure water is a mixture of about 30 compounds:
isotopes (from Deuterium, Tritium, Oxygen),
pH (OH_3^+, OH^-), including all the combinations of isotopes,
D_2O: the more common isotope (about 0.1% in many pure waters), particularly CO_2 when in contact with air.

It is impossible to purify in all domains simultaneously:
ions, solubilised organic molecules, dust, dissolved gases and to reach purities below 10^{-4} in a liquid, particularly water.

Even in a short contact with air, water absorbs a lot of "impurities", like CO_2. Water always dissolves most of the containers, particularly SiO_2, other oxides of glasses (Fe, B, polymer chains, etc.),

NA cancelled in calculation:
In physics, it is usual to do the ratio molecule/molecule.
For example a concentration of an aqueous solution equal to 10^{-4} means:
1 molecule of solute in 10 000 molecules of water, because 1/10 000 = 10^{-4}.

In chemistry the most common units are moles per liter.

1 liter of water has a mass equal to 1 kg = 1000 g = (1000/18) x NA molecules.
A solution of 10^{-4} moles corresponds, within the physics notation, to:
10^{-4} x NA/ ((1000/18) x NA) = 10^{-4} / (1000/18) = 1, 8 x 10^{-6} (1.8 molecules of solute in 1 million molecules of water)
The Avogadro number is not important, because it cancels in the calculation.

Statistics:
Two fundamental elements of homeopathic preparations must be seriously analysed: ***actual dilutions and role of "dynamisation".***
Concerning dilution procedures vs. actual concentrations, we are convinced that the values currently assumed and announced in homeopathy cannot be correct.
This statement is only based in simple statistical arguments. Indeed the "error bar" on actual concentration increases drastically with successive dilutions according to the theory of statistical sampling. As its magnitude is of the order of $N^{1/2}$, where N is the total number of molecules in a solution, for concentrations equal to CH6, the error is larger than 100%, even assuming perfect dilution along previous steps.
As said before, the calculation of the error bar and of the propagative error is a simple statistical exercise.

Due to these statements about concentrations, different substances and the role of "dynamisation" the Avogadro number should be avoided in scientific discussions.

We are looking forward to new approaches in scientific based homeopathy:

Long-lived submicrometric bubbles in very diluted alkali halide water solutions

E. Duval et al,

Phys. Chem. Chem. Phys. 14, 4125 (2012).

The author demonstrates experimentally, by Rayleigh scattering, that samples of pure water or low concentrated salt solutions that have been submitted to shaking, contain a large number of gaseous micro-bubbles that stay in the liquid for very long times, due to their small size.

The experimental evidence comes from a careful evaluation of the Landau-Placzek ration between Rayleigh and Brillouin scattering.

Our interest could focus on the behaviour of the interfaces liquid/air. Their area is very large and may play an important role in the distribution of surfactant molecules.

10^{23} - a limit in concentration in aqueous solutions or only a provocation of troublemakers?

Everybody with a scientific pharmaceutical background should easily follow the main mistakes in calculations of dilutions, which has been done by generations in the past.

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HomResearch

2014