

## Original Paper

# Redefine the Kilogram in Terms of the Carbon-12 Atom and an Exact Value of the Avogadro Constant

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### Abstract

We report on a method for redefinition of the kilogram by  $^{12}\text{C}$ , which ideally joins the atomic and the macroscopic mass units in a natural way. The kilogram artifact will be composed of a number of concentric shells around C-60 and that this is sometimes referred to as a ‘‘carbon onion’’. A 135887620-layer carbon onion containing 50184508751575328771368200 atoms of  $^{12}\text{C}$  falls in the acceptable range for the redefinition of kilogram and is closest to the recent experimental results. An Avogadro constant is thus derived to be 602214105018903945256418.4. A perfect carbon onion is ideal for kilogram redefinition and determination of the Avogadro constant because it is expected to exhibit characteristics of central symmetry, high stability, high strength, high sphericity, low roughness, weak inter-planar force and strong in-plane bonding, easy atomic counting, and these are important for technical feasibility in further experiments.

### Keywords

Redefinition of kilogram – Avogadro constant – Carbon onion