A buckyball is a large molecule comprised of 60 carbon atoms arranged in a shape something like a hollow sphere 0.71 nm in diameter. Imagine that we create a beam of buckyballs all moving at the same speed *v*. What is the maximum value that *v* can have if the de Broglie wavelength of the buckyball beam is to be at least 10 times the size of the buckyball (so that we might actually be able to display interference of the buckyballs)?

Solution: According to the de Broglie, every microparticle can act as a wave, with a corresponding wavelength $\lambda$, which depends from the particle's speed: $\lambda = \frac{h}{m \cdot v}$, where $h$ = $6.63 \cdot 10^{-34}$ J·s – Planck's constant; $m$ – mass of the particle, kg; $v$ – particle's velocity, m/s;

As we see from the problem condition, $m = 60 \cdot m(C) = 60 \cdot 12 \cdot 1.66 \cdot 10^{-27} = 1.20 \cdot 10^{-24}$ kg;

$\lambda = 10 \cdot D = 7.1$ nm = $7.1 \cdot 10^{-9}$ m;

Then, $v = \frac{h}{m \cdot \lambda} = \frac{6.63 \cdot 10^{-34}}{1.2 \cdot 10^{-24} \cdot 7.1 \cdot 10^{-9}} = 7.78 \cdot 10^{-2}$ m/s;

**Answer**: $7.78 \cdot 10^{-2}$ m/s.

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