Methodology for Converting Doses

1. **Determine average particle size:** Particle size dimensions are preferentially selected according to availability. If only one dimension is provided, it is designated as length.
    a. Average particle size (measured)
    b. Median of particle size range (measured)
    c. Average particle size (nominal)
    d. Median of particle size range (nominal)
2. **Calculate particle volume:** Particle volume is determined according to shape as follows:
    a. **Sphere:** $V = \frac{4}{3}\,\pi\,r^3$ where r = length/2
    b. **Fiber:** $V = \pi r^2 h$ where r = width/2 and h = length
    c. **Fragment:** $\frac{\pi}{6} L^3 CSF^2$ where L = length and CSF = 0.4
        i. CSF = Corey Shape Factor, $CSF = \frac{H}{\sqrt{LW}}$, ~average CSF for irregular particles is 0.4 as determined by Kooi & Koelmans 2019 (1)
3. **Calculate particle mass:** Multiply calculated particle volume by density ($\rho V = m$). The reported density is preferentially used. If density is not reported, density estimates (2) based on polymer type and weathering are used:

Polymer	Chemical	Weathered
PE	0.935	1.01
PP	0.875	0.945
PET	1.205	1.385
PA	1.09	1.145
PS	1.07	1.09
PVC	1.34	1.525
PVA	1.25	1.28

4. **Calculate estimated dose:**
    a. **Particles/Volume → Mass/Volume:** Calculated particle mass is multiplied by the reported dose in particles per volume.
    b. **Mass/Volume → Particles/Volume:** The reported dose in mass per volume is divided by the calculated mass per particle.

References:

1. Kooi, M.; Koelmans, A. A., Simplifying Microplastic via Continuous Probability Distributions for Size, Shape, and Density. *Environmental Science & Technology Letters* **2019,** *6*, (9), 551-557.
2. Koelmans, A. A.; Redondo-Hasselerharm, P. E.; Mohamed Nor, N. H.; Kooi, M., Solving the Nonalignment of Methods and Approaches Used in Microplastic Research to Consistently Characterize Risk. *Environ Sci Technol* **2020**.