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Oil capture from a water surface by a falling sphere[1] LINDA SMOLKA, CLARE MCLAUGHLIN, Bucknell University, THOMAS WITELSKI, Duke University — When a spherical particle is dropped from rest into an oil lens that floats on top of a water surface, a portion of the oil adheres to the sphere. Once the sphere comes to rest at the subsurface, the oil forms a pendant drop that remains attached in equilibrium to the sphere effectively removing oil from the water surface. Best fit solutions of the Laplace equation to experimental profiles are used to investigate the parameter dependence of the radius of curvature and the filling and contact angles at the three-phase contact line of the pendant drop for spheres with different wetting properties, densities and radii. The volume of oil captured by a sphere increases with a sphere's mass and diameter. However, lighter and smaller spheres capture more oil relative to their own volume than do heavier and larger spheres (scaling with the sphere mass $\sim M^{-0.544}$) and are thus more efficient at removing oil from a water surface.

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Linda Smolka
Bucknell University

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