

## CW: Oil and Water Don't Mix

A useful rule, but one that can get you in trouble writes Molly Costanza-Robinson

"Oil and water don't mix" and its corollary "like dissolves like" convey a binary notion of molecules as being either polar (watery) or nonpolar (oily), and of a segregated sociochemical scene where like-molecules intermingle but shun others. These rules allow us to understand water beading up on a newly waxed car, salad dressing separating into its layers, and the lava lamp's distinct blobs of watery and oily chemistry that mesmerize. They also explain why large nonpolar organic molecules, including legacy pollutants like DDT, accumulate in fatty tissues of plants and animals and are passed on, mother-to-child, via lipid-rich breastmilk.\* But, the fact is, molecules exist on a continuum from watery to oily, and all molecules mix into each other to some degree. Carbon tet, an overtly toxic carcinogen released to the environment through various industries and, not incidentally, the oily chemical used in the original lava lamp, mixes with water sufficiently to exceed its safe drinking water limit by a factor of 162,000. Residents of cancer "hotspots" who drank carbon tet-contaminated water will assure you that oil and water do mix. Likewise, somewhat "oily" endocrine-disrupting chemicals (EDCs) dissolve ever-so-slightly out of our toys, food containers, cosmetics, and electronics into our food, drinks, and saliva. Some get inhaled on dust particles and dissolve in our lungs. In exchange for their flame-retardant and water-repellant properties and for the pleasing flexibility and rich textures imparted by plasticizers, consumers receive miniscule EDC concentrations -- concentrations that, nevertheless, rival those of our active hormones and set our endocrine system down unintended paths. Although discounted for years as "too low to matter", scientists are beginning to link EDC exposure to early onset of puberty in girls, dropping sperm counts in men, cardiovascular disease, obesity, and diabetes, among much else. So, do oil and water mix? In fact, they do -- at least a little, and if we're talking about toxins or EDCs, a little goes a long way

\* current research suggests that the many benefits of breastfeeding outweigh any risk posed by chemical contaminants

*Molly Costanza-Robinson is an associate professor of environmental chemistry.*