A Demonstration Model for Immiscibility

A toy recently marketed by the Wham-O Manufacturing Company can be used to illustrate various solubility principles simply, yet quite graphically. Magic Sand® consists of sand particles which have been coated with a colored layer of non-polar material, resulting in a free-flowing granular solid which is not wetted by water. It can be poured into water (where it clumps together and can be molded into various shapes) and yet is "instantly dry" and again free-flowing when removed from the water. Thus, it can serve nicely as a model for a non-polar molecular material. Instructors can point out that the "molecules" stay together upon contact with water even though the "intermolecular forces" are obviously weak. The "instant drying" feature shows that wetting never actually occurs. Different colors can be used to represent the "miscibility" of different non-polar materials, with the resulting "solution" still being "immiscible" with water. Vigorous stirring of the water-sand mixture will "emulsify" the material, but the "colloidal particles" will coalesce on contact. Water drops will bead up on a layer of the solid just as they do on non-polar surfaces. Mineral oil and other organic materials wet the granules, representing the interaction of non-polar solvents with non-polar solute molecules.

The material is available in toy stores, is relatively inexpensive, and can be recovered by filtration or decantation, followed by drying between paper towels or newspapers. Organic solvents may remove the coating, so small amounts should be used in conjunction with organic materials. Intense heat will remove the coating and leave the base material of ordinary sand.

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