

## AN INTRODUCTION TO SURFACTANTS AND BIODEGRADABILITY

A surfactant may be thought of as a “schizophrenic” chemical structure; one part of which likes to be surrounded by oil and hates water (*hydrophobic*) and the other part of which hates to be in oil and likes to be in water (*hydrophilic*). For this reason, if the material is dissolved in a solvent, the molecules will tend to group at the surface and it is said to be “*surface active*” or “*a surfactant*”. Because of this unusual property, surfactants are very versatile substances. In water-based washing processes, the oil-loving end of the surfactant sticks to the soil and grease particles and the water-loving end drags them from the dirty fabric or surface into the water phase and, ultimately, down the drain.

The oil-loving part of most surfactants is a fatty structure; derived from animal and vegetable fats or petroleum. When such a material reaches the environment it is decomposed by the action of the micro-organisms present; which use it as food in a process known as “*biodegradation*”. Just as human beings have dietary likes and dislikes, so different micro-organisms have preferences for different types of chemical structure. Thus, the micro-organisms may eat part of the molecule, destroying its surface-active properties in a process called “*primary biodegradation*” or they may eat it completely, resulting in “*ultimate biodegradation*”. Just as in humans, some of the food is “burned” to provide the energy to sustain life and the rest is used to generate more micro-organisms in the process of cell growth. The energy-producing part of the metabolic process consumes oxygen and results in the immediate formation of carbon dioxide, water and mineral salts and is known as “*mineralisation*”.

The carbon dioxide production or oxygen uptake (*mineralisation*) can be measured in internationally validated laboratory experiments designed to assess biodegradability and this is the basis of the new Detergents Regulation. Under the test conditions, 60% of the molecule being mineralised is recognised as indicating almost complete destruction, when it is remembered that the balance of the material may be used in new cell growth. Thus, the 60% *mineralisation* criterion in the new Detergents Regulation is far more demanding than the 80% *primary biodegradability* threshold in the present Detergents Directives and will ensure a high level of protection of the environment.