



Shell Chemicals

# HSE overview: surfactants

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## Physical Hazards

Shell surfactants do not have any defined physical hazards. They will burn but are not readily ignitable.

## Human Health

Alcohol ethoxylates are slightly to moderately toxic by ingestion and by skin contact. Acute oral LD50's range from 1 to >10 g/kg. Acute dermal LD50's range from approximately 2 to >5 g/kg. Ethoxylation of detergent range alcohols (with ethylene oxide) increases the acute toxicity of the alcohol. Undiluted alcohol ethoxylates are generally severely irritating to the eyes. Eye irritation does not appear to be significantly diminished until the products are diluted to 1%. Undiluted alcohol ethoxylates range from not irritating to moderately irritating to the skin. They are not regarded as sensitizers. There is some limited evidence of weak sensitization in guinea pigs for certain products, but no evidence in humans (patch-testing).

## Use

These products have a wide range of uses where surface active agents are required. These include household detergents and personal care products (bath soaps, shampoos, etc.). The exposure potential is high, especially in consumer product applications. However, it should be noted that the amount of the surfactant present in a finished detergent formulation can range from high to low.

## Environmental Fate and Effects

As noted above, linear alcohol ethoxylates are widely used in many applications. Once used, they generally find their way into surface waters. Detergents in consumer products are commonly disposed of "down the drain," usually ending up in a municipal wastewater treatment facility or a septic tank. Linear alcohol ethoxylates are readily and rapidly biodegraded to CO<sub>2</sub> and water. Removal in wastewater treatment facilities generally exceeds 99%. If there is no treatment facility, these products may be directly discharged into surface waters where they can have an adverse effect on aquatic life. However as a result of rapid biodegradation, any environmental impacts are likely to be local and recovery of ecosystems damaged by accidental spills should be rapid.

Surfactants are generally toxic to aquatic life. The most likely cause of toxicity is the direct physical effect of the surfactant's wetting ability. Wetting reduces water surface tension and causes disruption of membranes on the surface of the gill. This prevents the effective transfer of gases, resulting in the animals' suffocation. Generally speaking, when the ethoxylation chain length remains the same and the alcohol chain length increases, the aquatic toxicity increases. When the alcohol chain length remains the same and the degree of ethoxylation increases, the toxicity decreases.



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## Shell Chemicals

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