

IN VITRO ASSESSMENT OF SKIN IRRITATION OF SURFACTANTS MIXTURES ON A 3D EPIDERMIS

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BACKGROUND

Surfactants are present in most cosmetic products, pharmacological preparations, cleaning products, personal care, and even in food products.



Of special relevance is that surfactants are one of the most important components in cosmetics and cleaning products, comprising from 15% to 40% of the formulation. However, due to their relative ability to solubilize membrane lipids, many surfactants cause irritation when they come into contact with the skin or mucous membranes. Surfactant technology has become a valuable instrument for the investigation of the processes involved in dermal irritation. In general, the physicochemical properties of surfactants are decisive factors that determine whether the substance will cause irritation. This study is focused on the main adverse outcome at the skin level, irritation, assessed following the specific Test Guidelines (OECD) (439) that use an in vitro 3D reconstructed human epidermis (RhE) model.

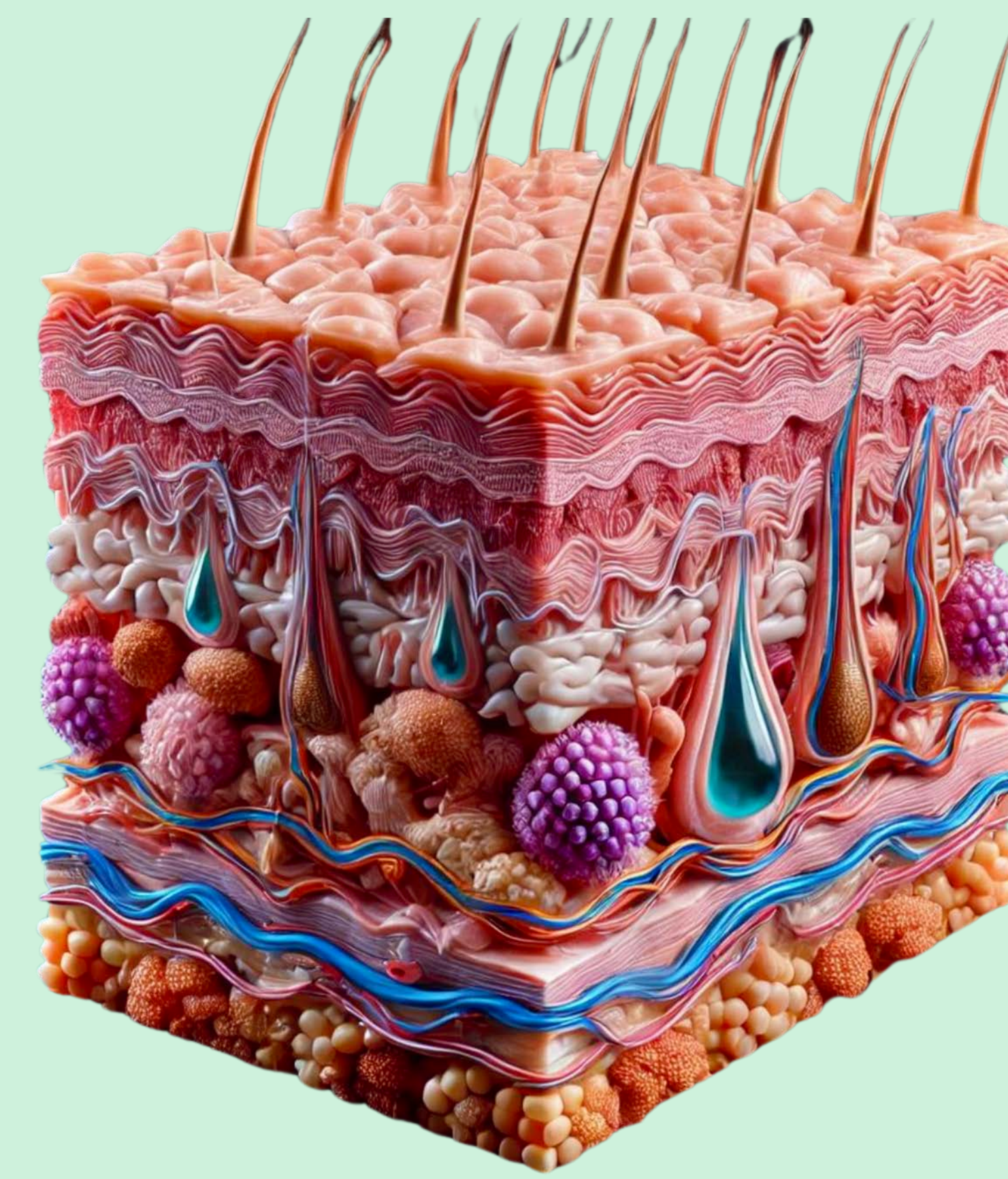
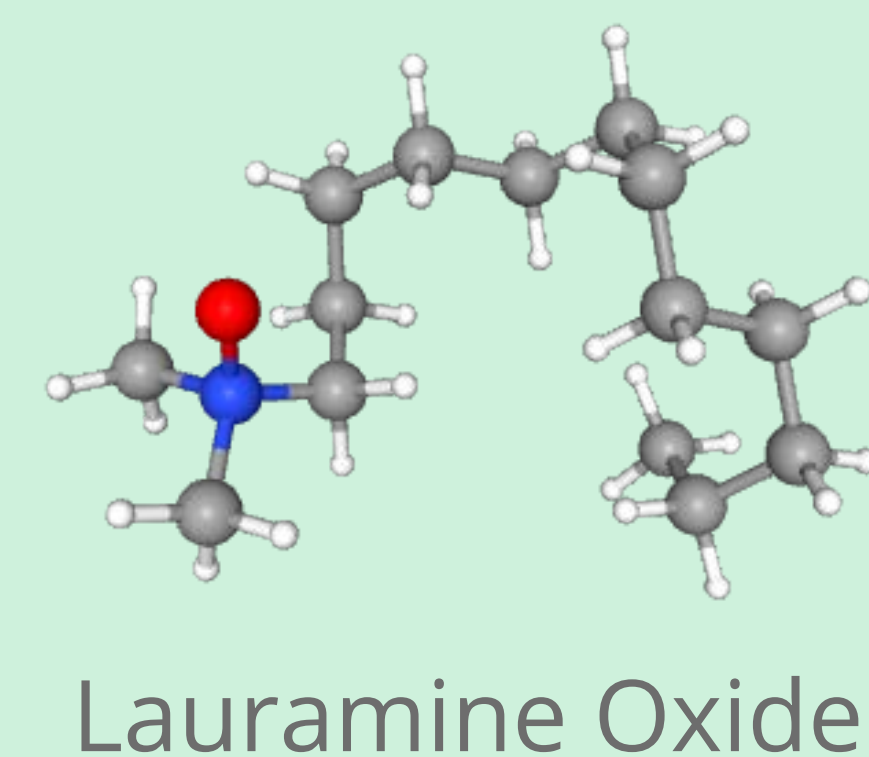
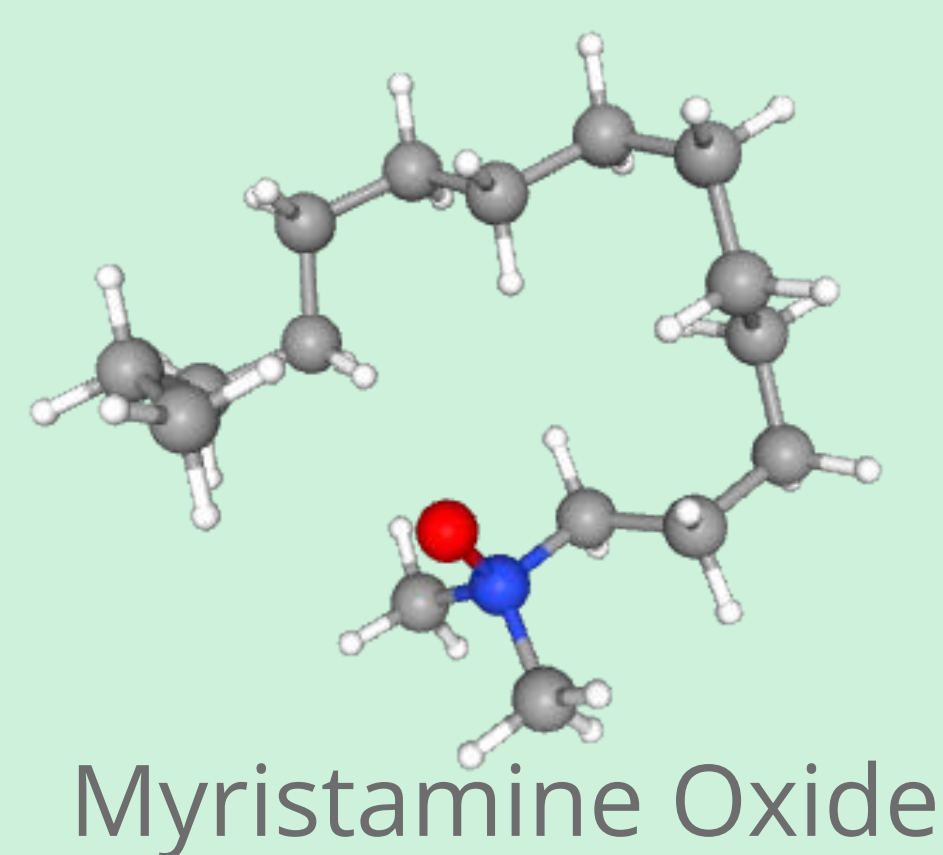
METODOLOGY



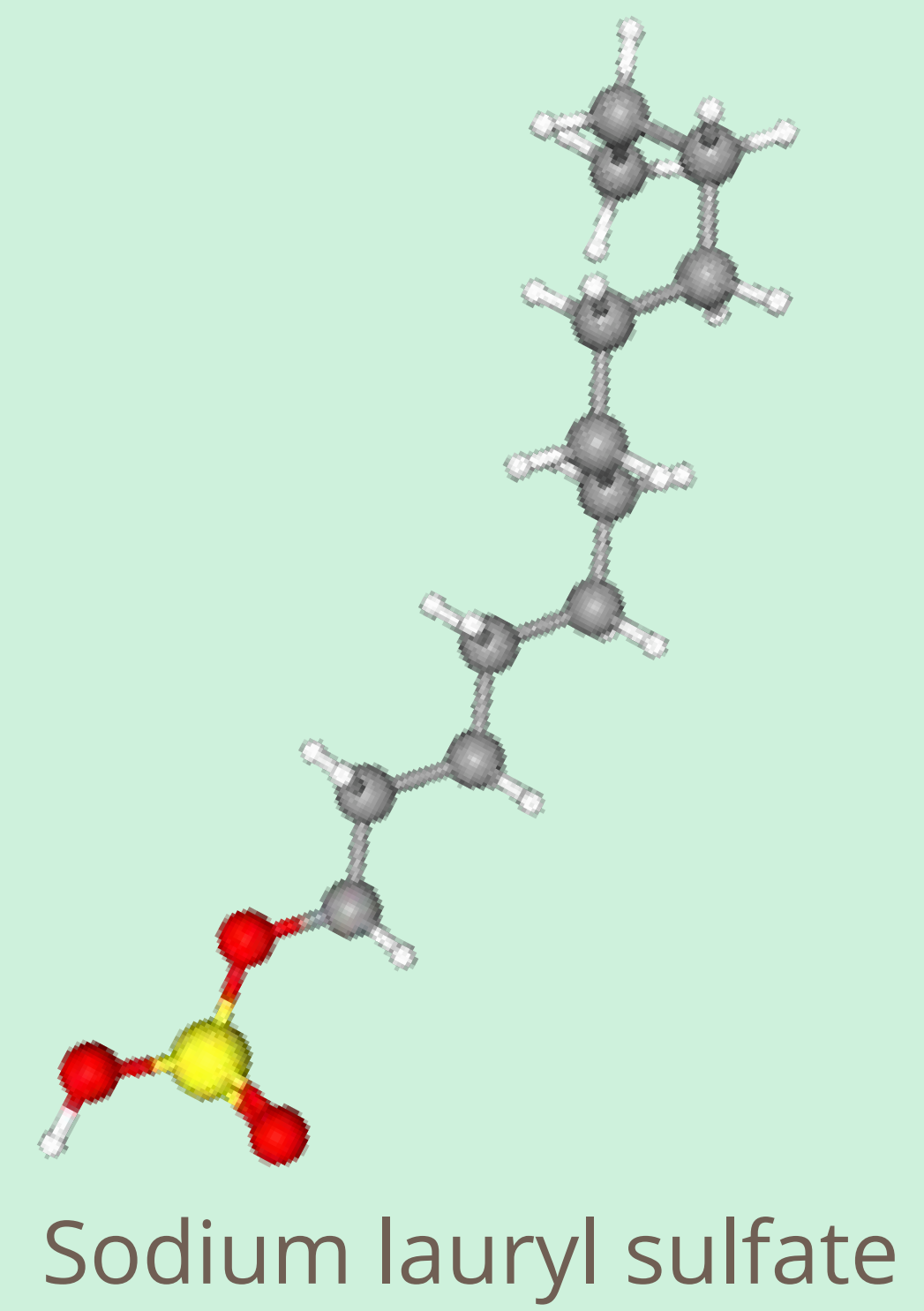
Tissues were incubated in 24-well plates with growth medium for 2 hours at 37°C and 5% CO₂. Following this, tissues were exposed to 16 µl of each toxic for 42 minutes.

R. Phosphate buffered saline (PBS) and 5% sodium dodecyl sulfate (SDS) were used as negative and positive controls, respectively. The tissues were thoroughly washed with PBS and incubated for another 42 hours. Subsequently, the tissues were treated with MTT solution and incubated again. The resulting formazan was extracted with isopropanol and homogenized. The optical density (OD) at 570 nm was measured to assess tissue viability, which was expressed as a percentage relative to the negative controls. According to OECD TG 439, a substance is considered an irritant if tissue viability is ≤50%.

MATERIALS

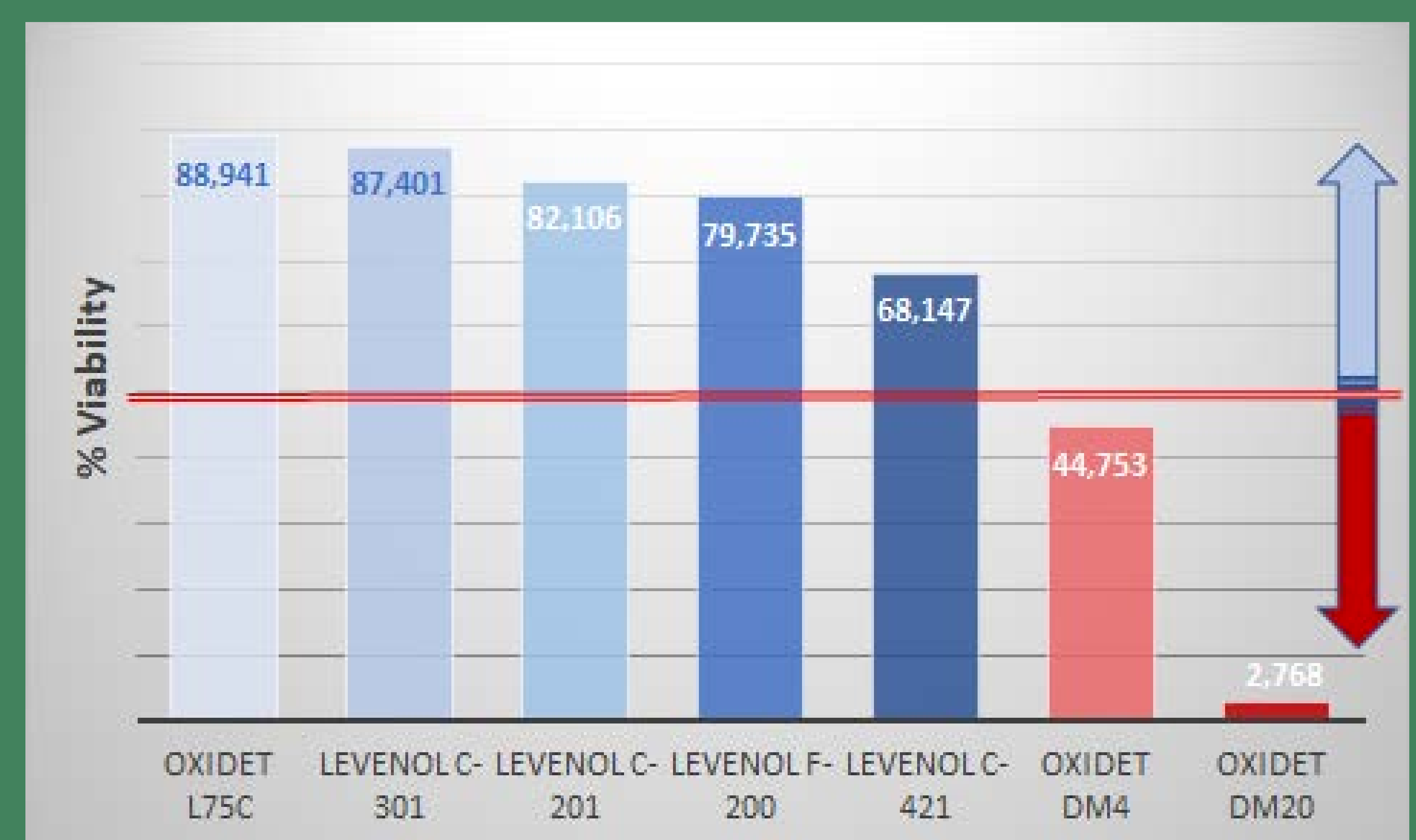
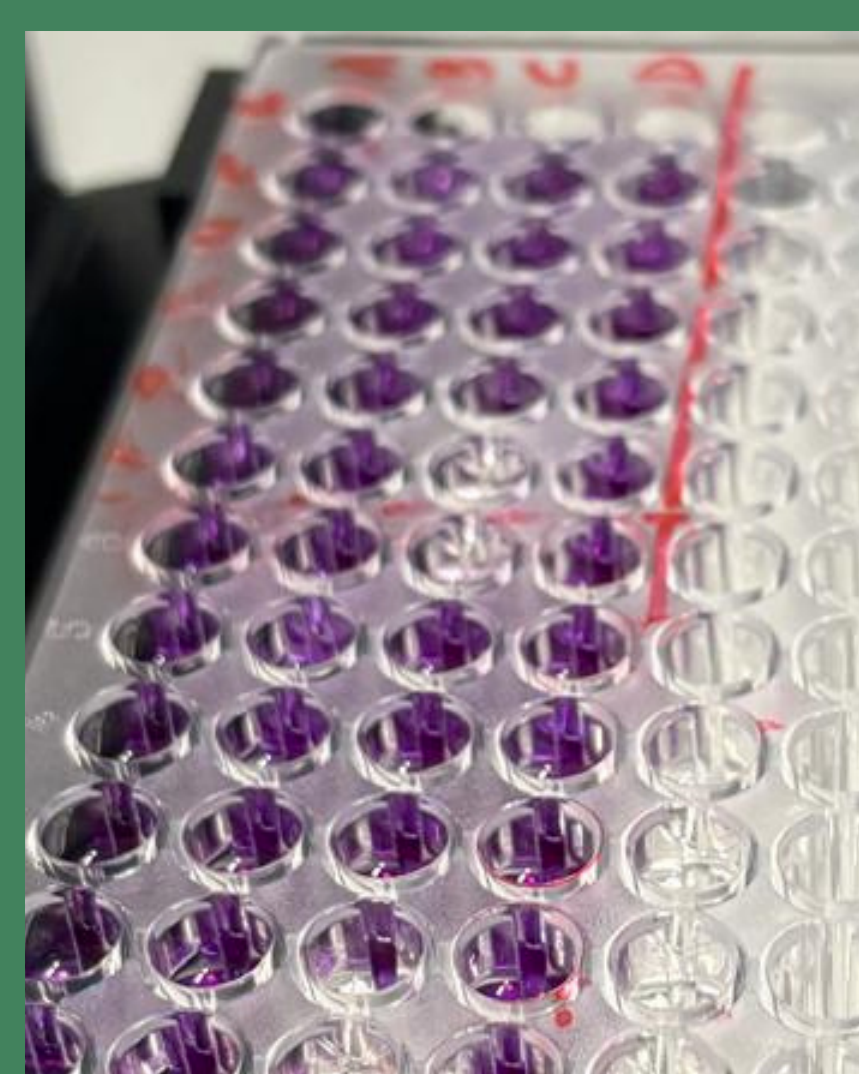


Scheme of an artificial human 3D skin

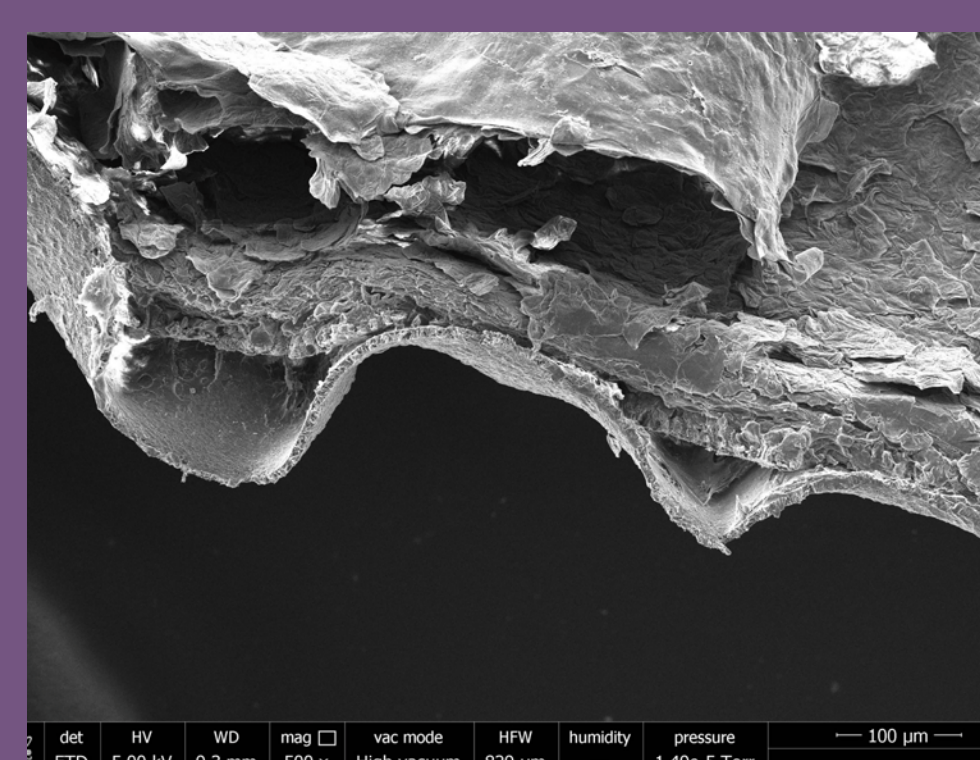


RESULTS

The non-ionic surfactants polyoxyethylene glycerol ester has the lowest risk of skin irritation ranging from 87.4-68,14 % viability. SDS and oxide amine surfactant are potentially irritating surfactants, except cocamidopropylamine oxide which has a different chemical structure than other amine oxides tested. Significant differences in skin irritation caused by surfactants have been observed, depending on their molecular structure and intrinsic properties.



CONCLUSIONS



The findings indicate a direct relationship between the potential irritant effect of surfactants and their structural characteristics such as alkyl chain length, CMC and HLB.

The evaluation of the skin irritation of the surfactants studied shows as a general conclusion that surfactants Polyoxyethylene glycerol ester have a minor irritation potential than Oxidized-based surfactants.

References

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RESEARCH GROUP



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