1. Introduction

The aim of the study was to assess the performance of a condenser-chamber TEWL instrument for barrier integrity testing, OECD Test Guideline 428 stipulates sensitivity.

Topically adhering water in its controlled, low humidity microclimate and (ii) higher

3. Results

3.1 Experiments with Sil-Tec membranes

Initial experiments used Sil-Tec membranes whose well controlled properties could be relied upon to verify the measurements. The controlled low-humidity microclimate within an AquaFlux measurement chamber offers a distinct advantage over conventional TEWL instruments, because any topical water evaporates quickly. The measurement chamber is effectively isolated from the external environment, and the drying progress and therefore give quality control information for the tests. These points are illustrated in Figure 2, where three different curves are shown.

3.2 Experiments with Teflon Membranes

Similar experiments were performed on snake skin sheets from different donors.

3.3 Experiments with SC

Measurements were performed on SC sheets from different donors before and after inflicted damage to ascertain a single puncture of 50±10µm diameter. The results are presented in Figure 5.

3.4 Experiments with Epidermis

Similar experiments were performed with epidermis sheets. The results presented in Figure 6 demonstrate the capability of the AquaFlux to differentiate between intact and damaged membranes.

5. Conclusions

The main points arising from the study are:

• Experiments with repeat measurements on epidermis and SC under otherwise similar conditions show that AquaFlux measurements are repeatable to better than 1% Coefficient of Variation.

In practical membrane integrity testing, the AquaFlux offers distinct advantages over conventional TEWL measurements:

1. Its controlled microclimate produces consistent measurement conditions irrespective of ambient humidity.

2. The low chamber humidity causes topically adhering water to dry off quickly during measurements, thus reducing reliance on drying prior to measurement.

3. The recorded water vapour flux curves clearly show the drying progress and give quality control information for the tests.

4. The software can be set to terminate the test automatically when the quality criteria are met, thus ensuring that the tests are neither prematurely terminated nor run for longer than necessary.

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References


Figure 7. Snake Skin Species Analysis.

Figure 8: Coefficient of Variation CV% for nine repeat measurements on three epidermis and three SC samples.

The Coefficient of Variation was found to be less than 1% for all the samples tested. This corresponds to a standard deviation of less than 0.13 g/m² h⁻¹.

Therefore, the changes of flux density recorded in Figure 5 are undoubtedly caused by sample damage and not by random fluctuations.

Figure 9: Coefficient of Variation CV% for nine repeat measurements on three epidermis and three SC samples.

Figure 10: Coefficient of Variation CV% for nine repeat measurements on three epidermis and three SC samples.