



EPR

Anti-aging and EPR Spectroscopy

With Magnostech ESR5000

Innovation with Integrity

Several factors including pollution, stress, nutrition and light exposure challenge skin health. Skin is very susceptible to UV radiation, therefore adequate sun protection is essential to control UV-related disorders, including sunburn, photo-aging and photo-carcinogenesis. Modern multifunctional skin care products are increasingly complex and confront the industry with new problems in product development.

Active ingredients and basic raw materials may increase the burden of free radicals in the formulations and/or inside the skin, even though they were designed to do just the opposite.

Some of the free radical sources include:

- Unsaturated fatty acid components, in either natural oils or emulsifiers, increase the risk of lipid peroxidation under UV light.
- Photo unstable UV blockers may enhance the peroxide radical concentration when applied on the skin.
- Moisturizers may influence the radical content of skin during UV radiation by increasing the penetration of UV rays into deeper layers of the skin. With higher skin hydration, the risk for free radical formation is increased.
- Perfumes and dyes are among the ingredients with the highest risk of peroxide radical contamination. Radical chain reactions may occur under UV radiation.



Challenge:

Free radicals in skin care products are generated by UV exposure thereby damaging the skin via free radical reactions. Screening of a product's efficacy and safety can be evaluated via stress testing. There is a need for highly efficient antioxidants that are resistant to environmental oxidative stress and remain active for a lasting time period.

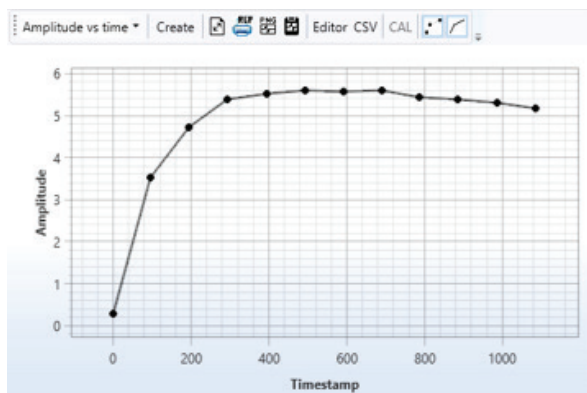


Figure 1 Photostability of sunscreen formulation. The evaluation view in the software ESRStudio allows easy monitoring of the free radical behavior

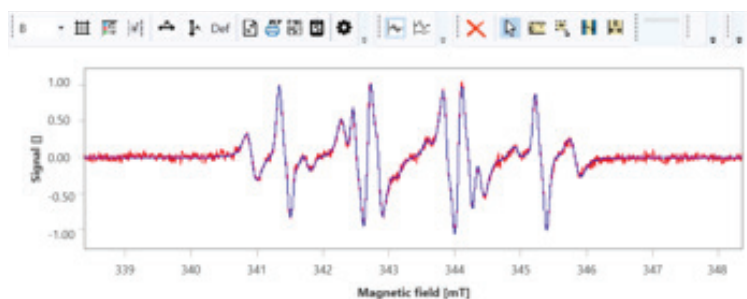


Figure 2 Radical identification and relative contribution using SpinFit Liquids and the spin trap database.

Summary:

UV radiation leads to radical reactions in anti-aging and skin care products that can be monitored by EPR spectroscopy. The Magnetech ESR5000 package is the solution to determine the antioxidant efficacy of the formulations and thereby help to improve their shelf-life and performance.

Solution:

The Magnetech ESR5000 benchtop EPR spectrometer package

- Tests skin care formulations to measure the extent of photo-aging
- Monitors free radical reactions that result during photo-degradation of formulations
- Determines the efficacy of antioxidants and UV blockers:

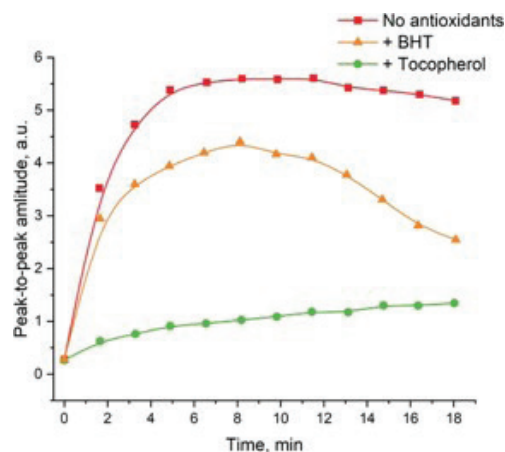


Figure 3 Evaluation of antioxidants' effect on a skin care product during UV-irradiation

UV-Vis Light system for in situ sample irradiation features:

- Integrated light source for sample irradiation
- Direct operation through ESRStudio software for fastest response times (a few microseconds)
- High-power LED
- Intensity changeable from 0% to 100%
- Wavelengths: 365 nm, 462 nm, 523 nm, 590 nm, 625 nm and 850 nm

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