Solubility and Stability Studies of Benzoyl Peroxide in Non-Polar, Non-Comedogenic Solvents for Use in Topical Pharmaceutical Formulation Developments

Maria E. ACEVEDO 1†, Adriana FERNANDEZ 1†, Ricardo C. PASQUALI 1, Patricio A. SORICHETTI 2, Rosa SERRAO 1, Carlos BREGNI 1, & Viviana S. MOURIÑO 1,3,4*

1 Department of Pharmaceutical Technology, Faculty of Pharmacy and Biochemistry, University of Buenos Aires, 956 Junín St, 6th Floor, Buenos Aires CP1113, Argentina.
2 Liquid Systems Laboratory, Faculty of Engineering, University of Buenos Aires, Paseo Colón 850, 2nd floor, Buenos Aires CP1063, Argentina.
3 Department of Materials, Imperial College London, Prince Consort Road, London SW7 2AZ, UK.
4 National Science Research Council (CONICET), Buenos Aires, Argentina

SUMMARY. Non-irritant, non-comedogenic and non-polar emollients were pre-selected for determinations of relative dielectric permittivity and solubility of benzoyl peroxide (BP). Those solvents capable of solubilizing BP in concentrations commonly utilised in topical formulations (between 1 and 10 %) were taken into account for stability studies. The developed pre-formulations were also studied for acute irritation both clinically and instrumentally. Even though the solubility of BP in the solvents studied had relatively low values; in some cases, such as with caprylic/capric triglyceride (CapCap) and dicaprylyl carbonate (DicCar) it has been possible to obtain acceptable concentrations of BP from a therapeutic viewpoint (19.9 and 19.5 mg/mL, respectively). Two BP pre-formulations (PBCapCap and PBDicCar) with enhanced stability and with the capability to decrease adverse application site reaction by maintaining moisture in the stratum corneum were developed with potential application in topical formulations of BP with solvents of low relative dielectric permittivity (CapCap and DicCar, respectively).

KEY WORDS: Benzoyl peroxide, Pre-formulation, Solubility, Stability, Thermodynamic activity.

* Author to whom correspondence should be addressed. E-mail: vmourino@ffyb.uba.ar
† These two authors share first co-authorship status.