

# Preparation of Topical Cream for the Potential Treatment of Atopic Dermatitis

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## Introduction

- Atopic dermatitis (AD) is a chronic skin condition with recurring flare-ups.<sup>1</sup>
- Project goal: create a cream with confidential active pharmaceutical ingredients (API) for AD treatment.
- Presentation focuses on cream preparation and characterisation due to API confidentiality.



Fig 1. 'Flare-up' in AD on the neck

## Objectives

- Prepare creams with ingredients Lipid DIMODAN U/J, Pluronic F127, and various oils.
- Characterisation goals : Measure pH, assess spreadability, determine thermal stability and conduct in vitro occlusivity test.

## Methodology

### Preparation of cream using DIMODAN and 1% Pluronic F127 solution.

Create different cream formulations by adjusting the proportions of Lipid DIMODAN U/J (Monoglyceride) from Danisco and the 1% Pluronic F127 solution.

### Preparation of cream using DIMODAN and 1% Pluronic F127 solution and oils.

Enhance formulation stability by adding various oils, such as coconut, corn, sunflower, avocado, soybean, almond, and sesame.

## Characterisation<sup>2</sup>

**pH measurement:** Determine pH by applying 500mg of cream on Whatman pH indicator paper for 10 seconds, with triplicate experiments.

**Spreadability:** Assess spreadability by placing 0.5g of the formulation in a marked 1cm circle on a glass plate, applying a second plate with a 500g weight for 5 minutes, and averaging results from three determinations.

**Thermal Stability:** Evaluate thermal stability at 20°C, 30°C, and 40°C using an oven.

**In vitro occlusivity test:** Conduct by placing 10g of distilled water in sealed vials with a 2cm diameter Whatman filter paper. Apply 100mg of the sample on the filter paper's upper surface and leave at room temperature for 24 hours.



Fig 2. Set-up of in vitro occlusivity test

## Results

- Optimal formulation ratio: 6:4 (Lipid DIMODAN U/J to 1% Pluronic F127 solution) for stability.
- Cream-like texture and spreadability achieved at 6:1:3 (Lipid DIMODAN U/J to oil to 1% Pluronic F127 solution).



Fig 3 a&b. 6:1:3 of Dimodan: Coconut oil: 1% Pluronic solution



Fig 4. All the formulation which were characterised

**pH measurement:** All formulations alkaline (7-8), potential for improvement.

**Spreadability :** All similar, range from 2.2cm to 2.4 cm.

**Thermal stability:**

Formulations	20 °C	30 °C	40 °C
Coconut oil	P	P	P
Sunflower oil	P	P	P
Almond oil	N	N	N
Avocado oil	P	P	P
Sesame oil	P	P	N
Corn oil	P	P	N
Sovbean oil	P	P	P

Table 1. Thermal stability of different formulations

\*P-denotes stability of formulation, N-denotes instability of formulation

**In vitro occlusivity:**

Formulations	Average occlusion factor F (%)
Coconut oil	98.04
Sunflower oil	97.56
Almond oil	99.87
Avocado oil	99.07
Seasame oil	98.13
Corn oil	94.12
Soybean oil	97.98

Table 2. In vitro occlusivity of different formulations



Fig 5. Phase separation in almond cream after 24 hr at 20°C

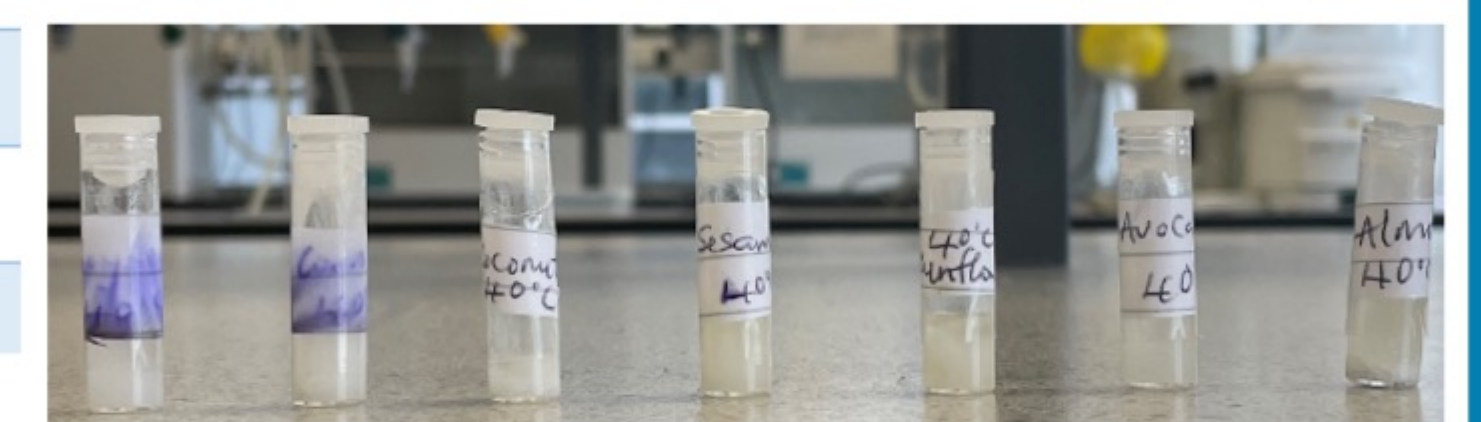


Fig 6. Formulations after 24 hr at 40°C



Fig 7. Formulations after 24 hrs

Overall, no significant difference in occlusivity among formulations.

## Conclusion

- Formulations have similar pH values, but pH meter precision is needed.
- Consistent spreadability observed, seeking more accurate testing methods.
- Notable thermal stability differences with certain oils; further experiments needed.
- Extending occlusivity testing to 48 and 96 hours for better results.

## References

- <sup>1</sup> Dou, J., Zeng, J., Wu, K., Tan, W., Gao, L., & Lu, J. (2019). Microbiosis in pathogenesis and intervention of atopic dermatitis. *International Immunopharmacology*, 69, 263-269. <https://doi.org/10.1016/j.intimp.2019.01.030>
- <sup>2</sup> Maru, A. D., & Lahoti, S. R. (2018). FORMULATION AND EVALUATION OF MOISTURIZING CREAM CONTAINING SUNFLOWER WAX. *International Journal of Pharmacy and Pharmaceutical Sciences*, 10(11), 54. <https://doi.org/10.22159/ijpps.2018v10i11.28645>