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Review Paper

Formulation and Evaluation of Cold Cream

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ABSTRACT

Cold cream has been one of the oldest known semisolid emulsions for cosmetic and pharmaceutical applications. Traditionally, it is recognized as a cleansing and moisturizing formulation intended to calm and protect the skin from dryness and environmental factors. Cold cream is primarily a water-in-oil (W/O) emulsion, composed of natural or synthetic oils, waxes, and water with emulsifiers like borax. The term "cold" refers to the perceived cooling experience upon application due to evaporating water. Cold cream formulations have adapted from simple Galenic preparations to modern multifunctional formulations with humectants, herbal extracts, and bioactive components. This review will describe the history, formulation design, mechanism, evaluation parameters, and recent developments with cold cream technologies. In addition, the relevance of cold cream in the skin and cosmetic industries will be discussed with emphasis on its thriving economy used in both skincare and as a base for pharmaceuticals.

INTRODUCTION

Cold cream is a semisolid emulsion, made from an oil-rich water-in-oil (W/O) emulsion, designed for cleansing, moisturizing, and soothing the skin. Its composition provides a distinct texture for cold creams as they create a thin oily layer to diminish trans epidermal water loss (TEWL) and protect the skin from dryness caused by the environment. Cold cream preparations usually consist of beeswax, mineral oil, borax, and purified water,

and they may contain optional ingredients such as humectants, preservatives, and fragrance.

The "cold" refers to the sweating effect the cream has upon application as the water phase evaporates, creating a feeling of coolness and relief. Cold creams are composed differently than other topical formulations because they provide two distinct functions: cleansing by dissolving and emulsifying oily impurities, and moisturizing by creating an occlusive barrier.

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In pharmacy and cosmetology, cold cream is categorized as an emollient and cleansing cream, with significant utility in dermatology, the cosmetics industry, and skincare. While cold creams can be used effectively as standalone cosmetic products, they can also act as a suitable base for medicated topical formulations, and are able to deliver drugs such as anti-inflammatories, antiseptics, and herbal extracts.

The development and assessment of cold creams take into account classic physicochemical and sensory characteristics to provide packaging stability, spreadability, viscosity, and pH acceptability for skin. Given a rational interest in natural and/or herbal preparations, many contemporary cold creams often contain plant extracts (e.g. aloe vera, shankhpashpi, turmeric, green tea) that can deliver added therapeutic properties.

Hence, cold cream may still be a viable contemporary product that straddles traditional formulation practices with modern cosmetic science.

1.2 Historical Background and Evolution

Cold cream can be traced back to the 2nd century AD, when Claudius Galen, a Greek physician, used a formula of olive oil, beeswax, and rosewater, known as "Galen's Cerate." This is widely recognized as history's first stable emulsion in a pharmaceutical context.

Galen's formula remained popular during the Middle Ages while being formulated with local ingredients. By the 19th century, it was in the British Pharmacopoeia (BP) and United States

Pharmacopoeia (USP), where cold cream was standardized as a W/O emulsion of beeswax, mineral oil, and borax. The inclusion of borax

(sodium borate) was revolutionary because it formed sodium salts of fatty acids when it reacted with free fatty acids that occurred in beeswax, thereby stabilizing the emulsion.

With the industrial revolution and a better understanding of cosmetic chemistry, formulations of cold cream began to include petrolatum, paraffin oil, and synthetic emulsifiers to improve stability and shelf life.

In today's world, cold creams have been reformulated many times to reflect consumer desires and dermatological needs. Today's cold creams may have non-comedogenic oils, antioxidants, vitamins A, E, and C, herbal extracts, and ultraviolet filters. The desire for eco-friendly and sustainable cosmetics led to new herbal- and organic-based cold creams made from coconut oil, jojoba oil, and aloe vera.

Therefore, from Galen's primitive emulsion to today's multifunctional cosmetic preparations, cold creams have greatly evolved, striking a balance between traditional ideas and scientific innovation.

1.3 Types of Cold Cream

Even though all cold creams have a basic W/O structure, they vary in their intent of use, formulation, and sensory properties of the formulation. There are four main categories:

1.3.1 Cleansing Cold Cream

- Formulated primarily to remove makeup, dirt, and excess oils.
- Contains a higher oil content to help dissolve lipophilic impurities easily.
- Typical ingredients include mineral oil, beeswax, borax, and lanolin.
- Example: Pond's Cold Cream Cleanser.



1.3.2 Moisturizing Cold Cream

- Formulated to enhance its emollient and humectant properties.
- Will contain agents such as glycerine, propylene glycol or urea to enhance the product's ability to retain water.
- Fun fact: they are ideal for dry skin and cold weather.

Ingredient	Function	Quantity (%)
Beeswax	Emulsifying and stiffening agent	12%
Liquid Paraffin	Emollient (oil agent)	50%
Borax	Emulsifying Agent	0.5%
Purified water	Aqueous Phase	37.5%
Perfume	Fragrance	q.s

1.3.3 Medicated or Therapeutic Cold Cream

- Contains an active pharmaceutical ingredient (API) such as an antiseptic, anti-inflammatory agent, or herbal extract.
- Medicated cold creams would be used for ailments such as eczema, rashes, and dermatitis.
- Example: Cold creams containing chlorhexidine or calendula extract.

1.3.4 Perfumed or Cosmetic Cold Cream

- These cold creams usually have a focus on aesthetics and sensory properties.
- Contain perfumes, colorants, and additional agents that enhance skin feel.
- Commonly marketed as beauty creams for use every day.
- Each cream can be customized with oil, wax, and water ratios for unique textures, spreadability, and absorption rates.

2. FORMULATION AND EVALUATION

2.1 Formulation of Cold Cream

2.1.1 Composition and Formula

A typical cold cream formulation (adapted from British Pharmacopoeia and standard texts) is given below:

2.1.2 Functions of ingredients

- **Beeswax:** Provides structure and consistency, and helps emulsify by forming the sodium salts of borax.
- **Liquid paraffin:** Serves as the oil phase and is an occlusive emollient that softens skin and inhibits moisture loss.
- **Borax:** Reacts with fatty acids in beeswax to form soaps, helping stabilize the emulsion.
- **Water:** Provides the internal phase of the emulsion and assists in creating the cooling effect.
- **Perfume:** Provides sensory interest and user acceptability.

2.1.3 Modern additives

To enhance performance and stability, modern cold creams may also contain:

- **Humectants:** Glycerine, Sorbitol
- **Preservatives:** Methylparaben, Propylparaben
- **Antioxidants:** Butylated hydroxy toluene (BHT), vitamin E
- Colorants and UV filters for cosmetic purposes and protection.

2.2 MECHANISM OF ACTION

The mechanisms of action of cold cream occur in two ways cleansing and moisturizing.



Cleansing Action:

The oil phase will dissolve makeup, lipid-soluble impurities, and sebum. The impurities are then removed with the cold cream when wiped off the skin.

Moisturizing and Emollient Action:

The emollient layer left on the skin provides protection against transepidermal water loss and improves skin feel. Beeswax and mineral oil contribute occlusive and lubricating properties, helping to maintain water content in the stratum corneum.

2.3 Manufacturing Process

2.3.1 Procedure

1. **Preparation of the oil phase:** Mix beeswax and liquid paraffin together in a water bath at temperatures of 70°C to 75°C.
2. **Preparation of the aqueous phase:** Dissolve borax in purified water and heat up to the same temperature.
3. **Emulsification:** Slowly and gradually add the aqueous to the melted oil phase, while continuously stirring the entire time until it forms a uniform emulsion.
4. **Cooling and perfuming:** Gently stir during cooling to maintain uniform consistency. Add perfume when the emulsion is below 40°C.

2.3.2 Important parameters

- Both phases need to be approximately the same temperature for phase separation prevention effects.
- Gentle and constant stirring creates a smooth texture.
- Adequate homogenization will enhance stability and spreadability.

2.4 Evaluation of Cold Cream

The quality and stability of the cold cream are assessed through various pharmaceutical and cosmetic evaluation parameters:

1. Physical Appearance

Assessed for smoothness, homogeneity, and absence of grittiness.

2. pH Measurement

Should be pH 5.0–7.0 compatible with skin.

3. Viscosity

Measured with a Brookfield viscometer; optimum viscosity allows for easy and uniform spreadability.

4. Spreadability

Assesses the ease of spreadability of the cream on the skin; higher spreadability is more desirable for user acceptability.

5. Stability Studies

Stability studies are undertaken at different temperature and humidity conditions to see if there is any phase separation, change in color or Odor.

6. Washability

7. Irritancy Test

Irritancy tests are carried out using patches on animal or human skin to certify non-irritant characteristics.

8. Microbial Limit Test

Assesses if the formulations are free from microbial contamination, where methods conform to standard pharmacopeial methodologies.



3.APPLICATION AND USES

Cold cream is a versatile preparation with many pharmaceutical and cosmetic applications:

- **As a Cleansing Agent:** It removes makeup, dirt, and sebum without using strong surfactants.
- **As a Moisturizer:** It softens dry or rough skin.
- **As a Protective Barrier:** Protects the skin from windburn and dryness when it is cold.
- **As a Pharmaceutical Base:** Cold cream can be used to incorporate medicinal or herbal active ingredients into topical preparations.
- **As a Massage Cream:** Cold cream improves skin smoothness and circulation.

4. RECENT DEVELOPMENT AND INNOVATIONS

Innovations in consumer products have added a modern twist to their cold cream formulations:

- **Herbal Cold Creams:** Encourage the use of natural ingredients such as aloe vera, turmeric, Tulsi and neem for therapeutic benefit.
- **Nanoemulsion-Based Cold Creams:** Enable better skin penetration and improved formulation stability.
- **Non-Greasy Formulations:** Utilize lighter silicones and esters for better skin absorption.
- **Antioxidant-Enriched Creams:** Contain vitamins E and C to prevent oxidative stress and support hydrated skin.
- **pH-Balanced and Hypoallergenic Products:** Are designed for sensitive skin types.

These product developments will lead to better performance while extending shelf life and increasing consumer acceptance.

CONCLUSION

From the Galenic era to today, cold cream is a classic formulation that has maintained its importance. This simple, yet effective water-in-oil emulsion system provides both cleansing and moisturizing, which has made it a staple in skin care and cosmetics. Its ability to be an effective alternative vehicle for delivery of drugs, herbal extracts, and bioactive makes cold cream particularly relevant in pharmaceuticals. As research continues to point to new emulsifiers, natural ingredients, and nanotechnology, the cold cream we grew up with has transformed into a new class of scientifically advanced multifunctional products in skin care.

As a result, to this day formulation and evaluation remain a critical subject in pharmaceuticals, which offers an opportunity to marry tradition with modern formulation science.

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