

## CHAPTER 3: BIOACTIVE AND EXCIPIENTS PROFILE



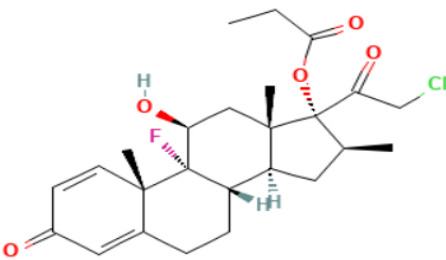


### 3.1 PROFILE OF BIOACTIVE CLOBETASOL PROPIONATE

#### 3.1.1 Clobetasol Propionate

Clobetasol Propionate is a topical synthetic corticosteroid with anti-inflammatory, anti-pruritic, and vasoconstrictive effects. Clobetasol propionate works by binding to cytoplasmic glucocorticoid receptors and activating glucocorticoid receptor-mediated gene expression as a result. This causes the production of anti-inflammatory proteins while limiting the production of inflammatory mediators. Clobetasol propionate appears to promote phospholipase A2 inhibitory proteins, which block phospholipase A2 from releasing the inflammatory precursor arachidonic acid from membrane phospholipids.

**Table 3.1: Physical properties of Clobetasol Propionate**

<b>Chemical name</b>	<b>Clobetasol propionate</b>
<b>Molecular formula</b>	C <sub>25</sub> H <sub>32</sub> ClFO <sub>5</sub>
<b>Molecular structure</b>	
<b>Molar mass</b>	467.0
<b>Appearance</b>	Solid
<b>Odor</b>	Characteristic odor
<b>Color</b>	White
<b>HLB value</b>	4.2

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<b>Melting Point</b>	196.25 °C
<b>LogP</b>	3.5
<b>Solubility in water</b>	4.13 ppm
<b>Solubility in methanol</b>	48000 ppm

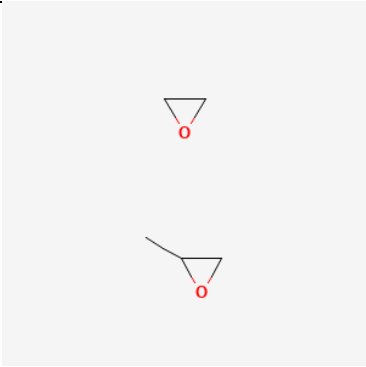
### 3.2 EXCIPIENTS PROFILE

#### 3.2.1 Surfactants

##### 3.2.1.1 Pluronic F-68

Pluronic F-68 is a non-ionic surfactant used in suspension cultures to control shear. Pluronic F-68 can also be used to decrease formation and cell adhesion to glass in stirred cultures.

**Table 3.2: Physical properties of Pluronic F-68**

<b>Chemical Name</b>	<b>Pluronic F-68</b>
<b>IUPAC Name</b>	2-methyloxirane;oxirane
<b>Molecular structure</b>	 The image shows two chemical structures. The top structure is oxirane, a three-membered ring with two carbon atoms and one oxygen atom. The bottom structure is 2-methyloxirane, which is an oxirane ring with a methyl group attached to one of the carbon atoms.
<b>Molecular formula</b>	C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>
<b>Molecular weight</b>	102.13
<b>Melting Point</b>	56 °C
<b>HLB value</b>	29

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<b>Surface tension (0.1% aqueous)</b>	41 dynes/cm at 25°C
<b>Form</b>	Liquid
<b>Ph</b>	6.0 - 7.0

### 3.2.1.2 Soya Phosphatidylcholines

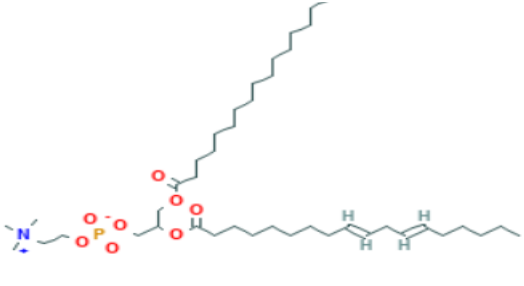
Phosphatidylcholines (PC) are a type of phospholipid with choline as the headgroup. They are a major component of biological membranes and can be extracted mechanically or chemically using hexane from a variety of readily available sources, such as egg yolk or soybeans. They're also part of the lecithin family of yellow-brownish fatty compounds that can be found in animal and plant cells.

Phosphatidylcholine is a prominent component of cell membranes and pulmonary surfactant, with the exoplasmic or exterior leaflet of a cell membrane being the most prevalent location. Phosphatidylcholine transfer protein is hypothesised to move it between membranes within the cell (PCTP).

**Table 3.3: Physical properties of soya phosphatidylcholines**

<b>Chemical Name</b>	<b>Soya Phosphatidylcholines</b>
<b>IUPAC Name</b>	[3-hexadecanoyloxy-2-[(9E,12E)-octadeca-9,12-dienoyl]oxypropyl] 2-(trimethylazaniumyl)ethyl phosphate
<b>Molecular structure</b>	

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<b>Molecular formula</b>	C <sub>42</sub> H <sub>80</sub> NO <sub>8</sub> P
<b>Melting point</b>	236.1°C
<b>Molecular weight</b>	758.1
<b>Uses</b>	Antistatic; Emollient; Emulsifying; Skin conditioning
<b>Form</b>	Powder
<b>Density</b>	1.0305 g/cm <sup>3</sup> (20°C)

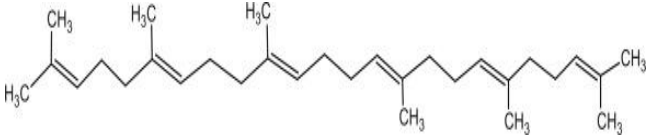
### 3.2.2 Squalene

Squalene is a natural substance. It is a triterpene with the formula (C<sub>5</sub>H<sub>8</sub>)<sub>6</sub>. Although impure samples appear yellow, it is a colourless oil. It was derived from shark liver oil at first (hence its name, as Squalus is a genus of sharks). Squalene is a metabolic intermediary produced by all plants and animals. The sebum is responsible for about 12% of body squalene in humans. Topical lubrication and protection are two functions of squalene.

**Table 3.4: Physical properties of Squalene**

<b>Chemical Name</b>	<b>Squalene</b>
<b>IUPAC Name</b>	2,6,10,15,19,23-hexamethyl-2,6,10,14,18,22-tetracosahexaene

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<b>Molecular structure</b>	
<b>Molecular formula</b>	C <sub>30</sub> H <sub>50</sub>
<b>Boiling point</b>	421.3 °C
<b>Molecular weight</b>	410.7
<b>Uses</b>	emollient, skin hydration, antioxidant, antitumor properties
<b>Form</b>	Liquid
<b>Density</b>	0.8584 at 68 °F

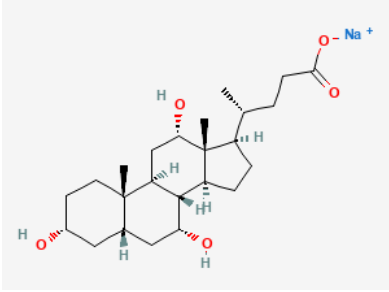
### 3.2.3 Sodium cholate

Cholic acid, also known as 3,7,12-trihydroxy-5-cholan-24-oic acid, is a white crystalline chemical that is insoluble in water but soluble in alcohol and acetic acid. Cholates are the salts of cholic acid. Cholic acid, along with chenodeoxycholic acid, is one of the two primary bile acids made by the liver from cholesterol. In humans, the concentrations of these two main bile acids are about equal.

**Table 3.5: Physical properties of Sodium cholate**

<b>Chemical Name</b>	Sodium cholate
<b>IUPAC Name</b>	sodium;(4R)4[(3R,5S,7R,8R,9S,10S,12S,13R,14S,17R)3,7,12trihydroxy10,13dimethyl2,3,4,5,6,7,8,9,11,12,14,15,16,17tetradecahydro1Hcyclopenta[a]phenanthren-17-yl]pentanoate

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<b>Molecular structure</b>	 The image shows the chemical structure of Clobetasol propionate sodium salt. It features a complex steroid nucleus with four fused rings (A, B, C, D). There are hydroxyl groups at C-11, C-13, and C-14. A propionate ester group is attached at C-17, and a sodium ion (Na+) is associated with the propionate's carboxylate group. Stereochemistry is indicated with wedges and dashes.
<b>Molecular formula</b>	$C_{24}H_{39}NaO_5$
<b>Melting point</b>	198°C
<b>Molecular weight</b>	430.6
<b>Uses</b>	skin protecting and skin conditioning
<b>Form</b>	white crystalline powder
<b>Density</b>	0.8584 at 68 °F