

**GLYCOL AND GLYCERIN: PIVOTAL ROLE IN HERBAL INDUSTRY AS SOLVENT/CO-SOLVENT**

Dr A.R.Padmawar<sup>1</sup> and Upendra Bhadoriya\*<sup>2</sup>

<sup>1</sup>Amruta Herbals PVT. LTD, Sanwer Road, Indore 452 015 (M.P.) India.

<sup>2</sup>Lachoo Memorial College of Science & Technology, Shastri Nagar, Jodhpur, Rajasthan, India.

\*Corresponding Author: Upendra Bhadoriya

Lachoo Memorial College of Science & Technology, Shastri Nagar, Jodhpur, Rajasthan, India.

Article Received on 13/03/2018

Article Revised on 03/04/2018

Article Accepted on 24/04/2018

**ABSTRACT**

Plants and herbs offer wide ranges of therapeutic applications and plant extracts now a day’s using extensively for the various purpose world widely. The expansion of herbal medicine in last decade helps researchers to explore knowledge of natural medicine globally. Recently many researchers paid great attention towards the development of herbal medicine and their quality standardization. The quality of herbal products greatly affected by the extraction procedure of herbal ingredients therefore herbal industry focuses towards the production of good quality extract using available resources. The use of specific solvent or co-solvent play vital role towards the success of extraction and sometimes these solvents also possess additive properties; glycol and glycerin are amongst such types of solvent which employed hugely in herbal industry for their additional benefits.

**KEYWORDS:** Herbal, Solvent, Extract, Glycol and Glycerin.

**INTRODUCTION**

Glycol and glycerin are chemically alcohols used as solvent or co-solvent offers wide range of advantages such as; biocompatibility, biodegradable, stable, hygroscopic, non-toxic and more importantly water-solubility. They also possess bacteriostatic and fungistatic properties thus acts as preservative. Glycol and glycerin mainly used in topical delivery system; cosmetics and personal care products. These compounds mainly employed as hydro-glycerinated and hydro-glycolic extract. Hydro-glycerinated extract may be obtained by macerating the plants material in a solvent mixture of water and glycerin while hydro-glycolic extract may be obtained by macerating the plants material in a solvent consisted of water and glycol mixture.

**Table 1: Water soluble and insoluble herbal extracts using unique solvents system.**

Water soluble extract	Water insoluble extract
Alcohol Extract	Oil Extract
Glycerin Extract	
Butylene Glycol Extract	
Propylene Glycol Extract	

**Glycerin Extraction**

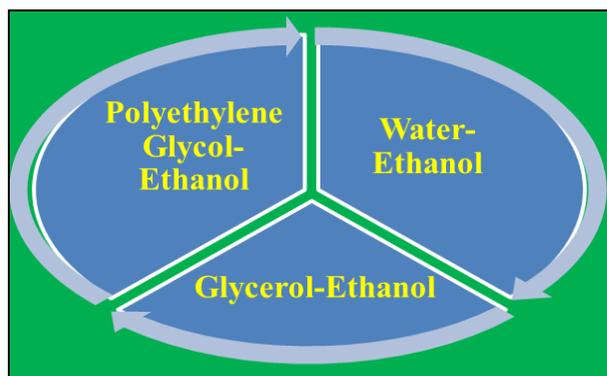
Glycerin is a good solvent for extracting herbal constituents usually employed as 60% mixture in water.

**Hydroglycolic Extract**

Hydroglycolic extracts involve use of butylene glycol or propylene glycol as 50% mixture in water.

**Table 1: Properties of Glycerin & Glycol.**

<b>Solubility enhancer</b>	Helps ingredients to dissolve
<b>Stabilizer</b>	Maintain products consistency even at different temperatures
<b>Emulsifier</b>	Help to mix variety of ingredients together
<b>Humectants</b>	Help to maintain moisture content
<b>Preservative</b>	Possess antimicrobial effect act as self preservative



**Figure 1: Common mixed-solvent systems used in herbal industry.**

**GLYCOLS**

Glycols are compounds chemically resides between alcohols and glycerol containing (-OH) group along with hydrocarbon skeleton. Glycols generally consisting of

two -OH groups (diol) with hydrocarbon chain while; glycerine possesses chemical structure of 3-ol (3-OH groups). Glycols not found naturally, synthesized through chemical process and their parent compound is ethylene glycol. Various research investigations proved that the Polyethylene Glycol (PEG) may be used for the solubility enhancement of different natural ingredients. The PEG either may act as a solvent or co-solvent or transport carrier; thus improve delivery of active ingredient to the site of action. The use of glycol does not comprise with safety issue since it is non-toxic solvents within specified limit.

#### Ethylene glycol

It is colourless, odourless and possessed sweet taste; considered as parent compound of all poly-ethylene-glycol (PEG) molecules since other glycols are synthesized from ethylene glycol. It is extensively applied in cosmetic industry as solubilizers, wetting agents, emulsifiers, foaming and cleansing substances.

#### Propylene glycol

It is higher hydrocarbon molecule after ethylene-glycol with 3 carbon atoms and diol system. It is a colourless and odourless liquid with a sweet taste. It is used in foods, beverages and in drinks as a solubilizer, fragrance enhancer and viscosity modifier. It is widely applied in mouthwash, toothpaste, industrial cleaners and as anti-freeze liquid. The hydrophilic plant extracts (hydroglycolic extracts) also a major utilization of propylene glycol.

#### Advantages of glycols as solvent in herbal industry

- ❖ Glycols offer slightly sweet scent and neutral colour.
- ❖ Glycols possess chemical stability long shelf-life.
- ❖ Propylene glycol is very good solvent thus used in hydrophilic plant extracts to improve stability.
- ❖ Act as carrier; enhance targeted delivery of natural ingredients.
- ❖ Propylene glycol also improves solubility of various natural ingredients.
- ❖ Glycols are used as humectants; reduces water activity thus enhance preservative effect.

**Table 1: Optimum Concentration for Self Preservative Action.**

S. No.	Type of Glycol	Concentration
1	Glycerol	>40%
2	Propylene glycol	>20%
3	Butylene glycol	>10%
4	Pentylene glycol	>5%
5	Hexylene glycol	>4%
6	Caprylyl glycol	>1%

#### Glycol Containing Products

- ❖ Mouth Wash
- ❖ Shampoo
- ❖ Conditioner
- ❖ Ointments
- ❖ Baby Wipes

- ❖ Deodorant
- ❖ Gel

#### GLYCERIN

Glycerin is a thick and gelatinous liquid, may be obtained by fermenting sugar or can also be synthesized by chemical process. Glycerin extensively employed in cosmetic & herbal industry. Glycerin act as humectants, help skin to remain moistened and protect from excessive dryness. Glycerin improves softness and appearance of skin. Glycerin also boosts strength of hair by facilitating moisture content into hair root. Glycerin offers solvent properties like water and aliphatic alcohols. It is completely miscible with water, methanol and ethanol; however it is less soluble in acetone, diethyl ether and dioxane.

#### Therapeutic uses of Glycerin

- Reduce pressure in the eye.
- Reduce brain swelling caused by brain hemorrhage.
- Used in the treatment of trigeminal neuralgia.
- Used to relieve constipation.

#### Glycerin containing products

- ❖ Moisturizing Body Wash
- ❖ Deodorant
- ❖ Soap
- ❖ Skin care products
- ❖ Topical cream
- ❖ Lip balm

#### Different foods that contain glycerin:

- Dairy Foods
- Processed Vegetables
- Baked Goods
- Alcoholic beverages and flavored beverages
- Sweeteners and nut butters, etc.

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