Chemical Grade

Polyethylene Glycol (PEG)

Liquid form

Characteristic	Test Method	Unit	PEG - 200	PEG - 300	PEG - 400	PEG - 600
MOLES OF EO	-	-	3EO	5EO	8EO	13EO
APPEARANCE	VISUAL	-	COLORLESS	COLORLESS	COLORLESS	COLORLESS
VISCOSOTY @ 40°C	ASTM D - 445	CSt	21-25	31-35	40-45	60-66
PH	ASTM D - 1172	-	5-7	5-7	5-7	5-7
HYDROXYL NO.	ASTM D - 4252	mg KOH/gr	510-623	340-415	261-303	172-204
M.W	CALCULATED	Kg/Kmol	180 -220	270-330	370-340	550-650
WATER CONTENT	BALLESTRA B - Z6	WT.%	0.5 MAX.	0.5 MAX.	0.5 MAX.	0.5 MAX.

Solid form

Characteristic	Test Method	Unit	PEG-1000	PEG - 2000	PEG - 3000	PEG - 4000	PEG - 6000
MOLES OF EO	-	-	22 EO	45 EO	72 EO	93 EO	152 EO
APPEARANCE	VISUAL	-	WHITE PASTE	FLAKE	FLAKE	FLAKE	FLAKE
VISCOSOTY @ 40°C	ASTM D - 445	CSt	36 - 40	80 - 100	150 - 210	260 - 360	600 - 900
PH	ASTM D - 1172	-	5 - 7	5 - 7	5 - 7	5- 7	5 - 7
HYDROXYL NO.	ASTM D - 4252	mg KOH/gr	106 - 119	51- 62	25.5 - 29.5	25 - 30	17- 22
M.W	CALCULATED	Kg/Kmol	940 - 1060	1810 - 2200	2700 - 3300	3740 - 4480	5100 - 7000
WATER CONTENT	BALLESTRA B -Z6	WT.%	0.5 MAX.	0.5 MAX.	0.5 MAX.	0.5 MAX.	0.5 MAX.

Poly ethylene glycols (PEGs) are family of water-soluble linear polymers formed by the additional reaction of ethylene oxide (EO) With mono ethylene glycols (MEG) or diethylene glycol. The generalized formula for polyethylene glycol is: H(OCH2 CH2) n OH

N: Average number of repeating ethylene oxide groups. There are many grades of PEGs that represents them by theirs average molecular weight. For example, PEG 400 consists of a distribution of polymers of varying molecular weights with an average of 400, which corresponds to an approximate average number of repeating EO groups (n) of ≈9.

Polyethylene glycols are available in average molecular weight ranging from 200 to 8000; this wide range of products provides flexibility in choosing properties to meet the requirements of many different applications.

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Polyethylene glycol (PEG)

Nomenclature of these products is different.

- CAS * name: ploy ethylene (oxyethylene) glycol.
  * Chemical abstracts Society
- IUPAC*name: poly ethylene Glycol
  * International Union of Pure & Applied Chemistry
- INCI * Name : PEG -4 , PEG-6 , PEG-8 ,
  *International Nomenclature Cosmetic Ingredient
- CTFA name : PEG-4, PEG-6,PEG-8
  * Cosmetics, Toiletry & Fragrance Association

Product	Chemical Description	INCI (CTFA) NAME
PEG 200	Poly ethylene glycol 200	PEG - 4
PEG 300	Poly ethylene glycol 300	PEG - 6
PEG 400	Poly ethylene glycol 400	PEG - 8
PEG 600	Poly ethylene glycol 500	PEG - 12
PEG 1000	Poly ethylene glycol 1000	PEG - 20
PEG 1500	Poly ethylene glycol 1500	PEG - 32
PEG 4000	Poly ethylene glycol 4000	PEG - 80

Depending on their average molecular weights, the Poly ethylene glycols may be liquid or solid at STD condition.

PEG grades: 200,300,400,600 in liquid form , PEG 1000 ,1500 soft solid (white) and PEG 2000,3000,4000,6000,8000 hard solid (white)

ARPC produces these rang of products to meet all applicable requirements in USP/NF for use in drug industries.

- **The most important physical property:**

Depend on molecular weight the wide range of the physical property such as solubility , hygroscopic , vapour pressure , melting or freezing point and viscosity are variable :

A: Solubility

Increasing the molecular weight of PEGs results in decreasing solubility in water & solvents.

PEGs are also soluble in many polar organic solvents such as acetone, alcohols.

B: Hygroscopic

PEGs are hygroscopic, it means that they attract and retain moisture from the atmosphere.

Hygroscopic decrease as molecular weight increases.

C: viscosity

PEGs can be considered Newtonian fluids, so the kinematic viscosity of PEGs decreases as temperature increases.

D: Stability

PEGs have low volatility and are thermally stable for limited period of time below 300°c and without o 2

Chemical Grade

Polyethylene glycol (PEG)

- **Applications:**
  - **Pharmaceuticals:**

PEG grades meet requirements of USP/ NF and BP and are widely use in pharmaceutical formulations. As solvent, water soluble, binder, lubricant, plasticizer and use in ointment base, tablet coating, gelatine capsule, liquid oral medications.

  - **Cosmetics:**

As the water soluble , odourless , neutral, hygroscopic, lubricant ,plasticizer, non-volatile , no irritating properties : The PEGs are used in wide range of cosmetics and personal care products such as creams , lotions , sticks , cakes , powders , jellies.

  - **Household products:**

Soaps, detergents, polishes & cleaners are main applicant of poly ethylene glycols, because these products are water soluble & inert, with low volatility and low toxicity.

  - **Ceramics and tile:**

As the plasticizer, lubricity, binders and carriers properties: PEGs are widely use in ceramic and tile industry.

  - **Adhesives and textile:**

As the plasticizer, lubricants, softeners, antistatic agents & conditional agents, PEGs are used in adhesives & textile industry.

  - **Other applications:**

- Agriculture as water solubility & solubilize for organic insecticides.

- paper , printing and inks as softener, humectants , solvents , lubricants & carriers

- Paints & coating as intermediates for alkyd & polyester resins.

- **Handling and storage:**

PEGs product are only slightly toxic & safe for use in domestic cleaning products , when handling products, recommended that use safety goggles, PVC gloves & apron.

In contact: with eye wash with running water for 15 minutes.

With skin wash area with water.

Injection: seek medical.

The PEGs product should be stored in dry, covered area and far away from sources of heat & ignition.

- **Packaging & shelf life:**

Liquid form of PEG (200 to 1000) are packed in 220 lit (net: 200 Kg) drums, each 4 drum stepped of a pallet.

Solid form(up to PEG 1000) packed in Bag (net : 25 Kg)

The PEG products have shelf life of 24 months from the date of manufacture & maintained in adequate storage condition.

Shelf life of pharmacy grades is 12 months.