



Arak Petrochemical Company



ISO 9001:2000  
Certificate No.: CH98/8032

ISO 14001:2004  
Certificate No.: CH03/0112

OHSAS 18001:1999  
Certificate No.: CH05/0675

## 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
VISCOSITY @ 40°C	ASTM D - 445	CS†	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
VISCOSITY @ 40°C	ASTM D - 445	CS†	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 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. The generalized formula for polyethylene glycol is:  $H(OCH_2CH_2)_nOH$

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 There are many grades of PEGs that represents them by their average molecular weight. For example, PEG 400 consists of a



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## Chemical Grade

### Polyethylene glycol (PEG)

Nomenclature of these products is different.

- CAS \* name: poly 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<sub>2</sub>



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## 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.