Recommended Cleaning Applications for DOWANOL P Series Glycol Ethers and PROGLYDE DMM Glycol Diethers

DOWANOL PnB, PnB/PM, PnP
- window cleaners
- window and multi-purpose cleaners

DOWANOL PnB, DPnB/DPM
- kitchen cleaners

DOWANOL DPnB/DPM
- all-purpose hard-surface cleaners

DOWANOL PnP
(concentrate up to six times)
- concentrates:
- kitchen cleaners
- window cleaners
- window/multi-purpose cleaners

DOWANOL DPnB/DPM, DPnP
(concentrate up to four times)
- all-purpose hard-surface cleaners

The high efficiency of most Dow starting formulations means they can be diluted even further if required, thereby reducing costs.

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series dowanol

Window Cleaners

Window cleaners consist primarily of water and solvent, the latter at a concentration which is typically in the range of 4% to 12%. Window cleaning products are usually sprays and are designed not to leave smears or streaks on windows. Streaks can be caused by traces of dirt or by residues of non-volatile chemicals used in the formulation.

A small quantity of surfactant must be added in order to wet the surface to be cleaned, but since these surfactants are non-volatile they may cause smearing. The choice of surfactant is therefore important. Anionic surfactants are recommended because they have a high affinity for water. In contrast, cationic surfactants may be strongly absorbed by glass. Non-ionic surfactants may absorb on to glass surfaces, especially those with lower hydrophilic/lipophilic balance (HLB) values. A HLB value is a measure of a chemical's tendency to partition between aqueous and organic phases.

Another useful attribute of many anionic surfactants is their ability to increase the water solubility of hydrophobic ingredients, such as perfumes and some hydrophobic glycol ethers.

Surfactants tend to be used in an acid form. To achieve the recommended alkaline pH of around 10, it is therefore necessary to add neutralizing or buffering agents, such as caustic soda or ethanolamines.

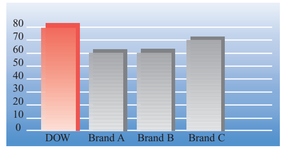
Minor additives used in window-cleaner formulations include dyes, chelating agents (when hard water is a concern) and electrolyte salts.

Use of DOWANOL P series glycol ethers in window cleaning formulations allows savings to be made by reducing the quantity of solvent needed without compromising cleaning performance. Often, solvent concentrations can be reduced significantly from typical levels of 8% to 12% down to 4% to 6%. The low surface tension of DOWANOL P series increases surface wetting, which makes the cleaning task easier.

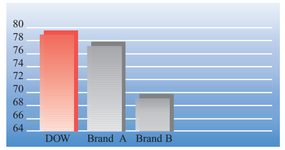
Window and Multi-purpose Cleaners

Window and multi-purpose cleaners are also formulated as sprays. The are used on glass as well as on other surfaces, and so their formulation is a compromise between those of window cleaners and kitchen cleaners. The major differences from window cleaners are a higher solvent content and a slight increase in surfactant concentration. These differences improve the ability to remove grease without causing undue smearing when the products are used on glass.

Performance Effectiveness for Window Cleaners (spray):



Performance Effectiveness for Window and Multipurpose Cleaners (spray):



Concentrated Window, or Window and Multi-purpose Cleaners

Concentrated produtcs are usually supplied as refill packs, as they offer savings in the amount of water transported and in the amount of plastic packaging required.

DOWANOL PnP[3] is the solvent of choice for these formulations, thanks to its low odour and complete water solubility. In addition, its low surface tension gives excellent degreasing properties. DOWANOL PnP can be used to replace DOWANOL PnB[4]/PM[5] blends.

Use of DOWANOL PnP may enable a formulation to be concentrated from four up to six times without stability problems.

The high water solubilty of DOWANOL PnP also makes it possible to use high HLB nonionic surfactants (along with anionic surfactants) in these products.

[3] Propylene glycol n-propyl ether
[4] Propylene glycol n-butyl ether
[5] Propylene glycol monomethyl ether
[6] Dipropylene glycol dimethyl ether

Kitchen Cleaners

Kitchen cleaners are usually non-dilutable spray cleaners with outstanding grease-cutting properties. They are ideally suited to removing burnt-on grease from tiles and walls in kitchen and from around stoves, although they are not intended as oven cleaners. Kitchen cleaning products represent a relatively new market sector, which is growing quickly in Europe because of their frequent, often daily use.

Kitchen-cleaner formulations normally include hydrophobic solvents at concentrations of 5 to 10%, and anionic/nonioic surfactants. A highly alkaline pH is usually preferred, and this is achieved by adding caustic soda or ethanolamines.

All-purpose Hard-surface Cleaners and Concentrates

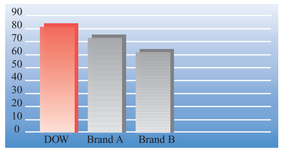
All-purpose hard-surface cleaners and concentrates are normally formulated for dilution. If these formulations are diluted with tap water, they will require builders to soften hard water. Builders such as citrates, phosphates and carbonates are invariably included in products which are diluted by the user. Technically, all-purpose hard-surface cleaners can be considered to be the same as kitchen cleaners with the addition of builders.

A builder is a substance that increases the effectiveness of a soap or synthetic surfactant by adding to its detergent power.

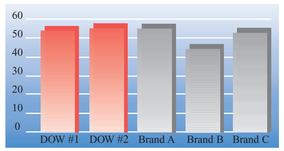
The major solvent which has been used in these formulations is diethylene glycol n-butyl ether, which has the disadvantage of being an irritant (Xi). An attractive alternative is to use blends of DOWANOL DPM[1] and DPnB[2] glycol ethers, along with lower levels of surfactant. This avoids irritancy due to solvent while maintaining cleaning performance, and also reduces smearing on cleaned surfaces.

[1] Dipropylene glycol monomethyl ether
[2] Dipropylene glycol n-butyl ether

Performance Effectiveness for Kitchen Cleaners (spray):



Performance Effectiveness for All-Purpose H/S Cleaners:



Dilution: 1.5 g cleaner/100 g water

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Starting Formulations for Hard-surface Liquid Cleaners

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Introduction

This brochure provides information on starting formulations developed and tested by Dow using DOWANOL* P series glycol ethers. The performance data and guidelines are for a variety of hard-surface cleaning products. Described in this brochure are:

- **Window cleaners**
- **Window and multi-purpose cleaners**
- **Kitchen cleaners**
- **All-purpose hard-surface cleaners**
- **Concentrated cleaners**

The performance data apply to specific formulations prepared by Dow whose compositions fall within the range of the examples given or are very close to them.

The cleaning test used by Dow is a standard one employed by the detergent industry. The formulations have been tested with leading brand-name cleaning products. A difference of 3% between test results is considered significant: already at this level, the difference in the performance of products becomes noticeable.

Note that the data relate to starting formulations. When formulating finished products, it is advisable to aim for a cloud point above 45° C. This is the temperature at which the formulation becomes turbid. There is a degree of freedom as to the range and percentage of chemicals which can be added to these formulations. However, even minor ingredients such as perfumes or dyes can have a major impact on the stability of a finished product.

Specific pH values are recommended in most cases. These values can be achieved by adding citric acid or caustic soda.

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