



Dow Consumer & Industrial Solutions

DOWANOL™ DiPPH Glycol Ether

Offers excellent degreasing performance with minimal streaking and filming in a variety of cleaning applications. DOWANOL™ DiPPH qualifies for the LVP exemption, making it an excellent choice for use in low-VOC formulations.



Overview

DOWANOL™ DiPPH Glycol Ether is an innovative technology from Dow, having been specially developed to offer outstanding degreasing and cleaning performance with minimal streaking. It also qualifies for the U.S. EPA and California CARB Low Vapor Exemption (LVP), making it an excellent choice for applications covered by the new low-VOC requirements. As a solvent*, it offers outstanding cleaning and degreasing performance across a variety of cleaning applications with excellent resistance to filming and streaking, and can also help to control foaming.

Suggested applications include:

- All-purpose cleaners and degreasers
- Grill and oven cleaners
- Carpet cleaners
- Bathroom cleaners
- Window cleaners
- Cleaners for granite and stainless steel surfaces



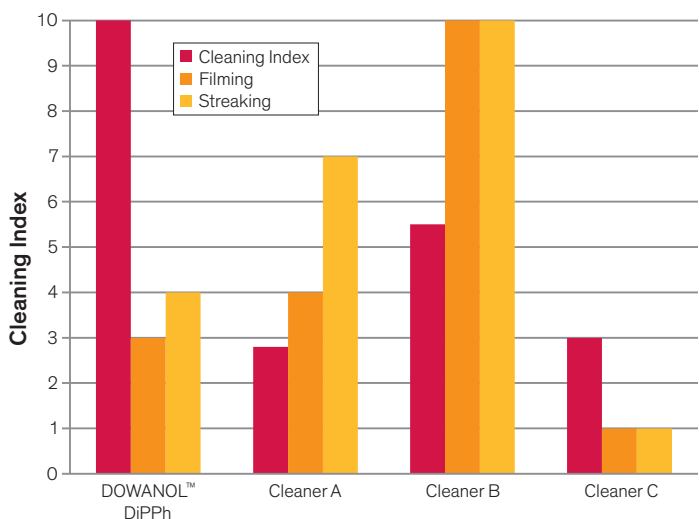
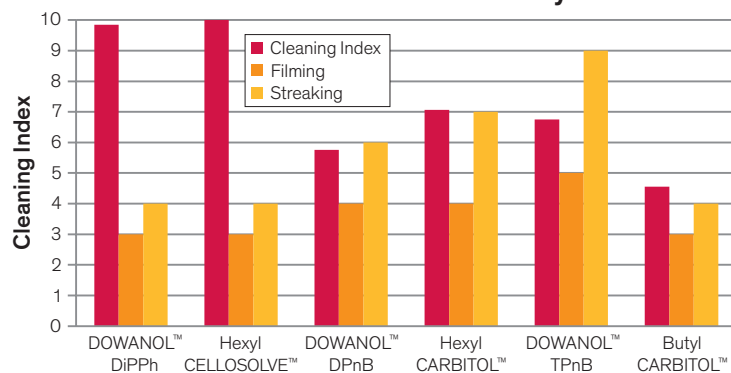
* 60% biodegradation achieved within 7 days and 100% biodegradation achieved within 28 days per OECD 301F.

Performance in All-Purpose Cleaning Products

To evaluate the performance of DOWANOL™ DiPPH Glycol Ether in an all-purpose cleaner/degreaser, 1% DOWANOL™ DiPPH or an alternative glycol ether were added to a base formulation. As shown in the chart on the right, the formulation containing DOWANOL™ DiPPH provided excellent cleaning performance as compared to the other glycol ethers, with notably less filming and streaking.

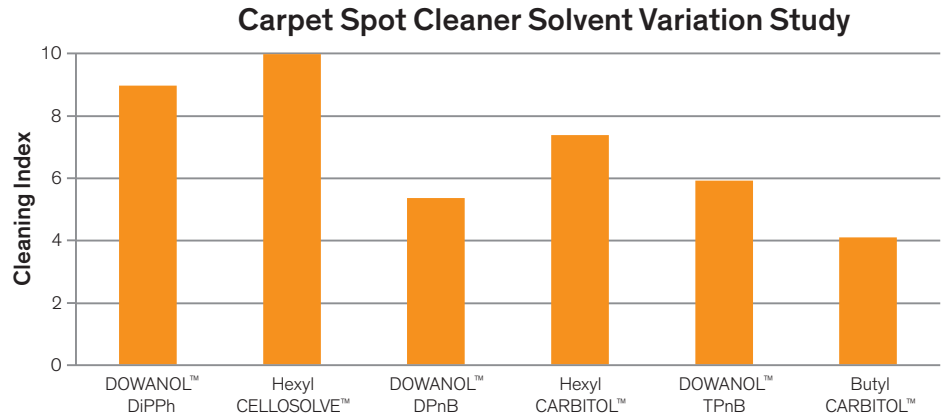
This base formulation with 1% DOWANOL™ DiPPH was compared to commercial products. As shown in the chart below, this formulation based on DOWANOL™ DiPPH outperformed the commercial products on the basis of cleaning index, with comparable to notably less filming and streaking. The cleaning index was measured on a scale of 1–10, with 10 representing the highest level of cleaning. For the filming and streaking indices, lower values represent positive results (less filming and streaking).

All Purpose Cleaner and Degreaser Solvent Variation Study

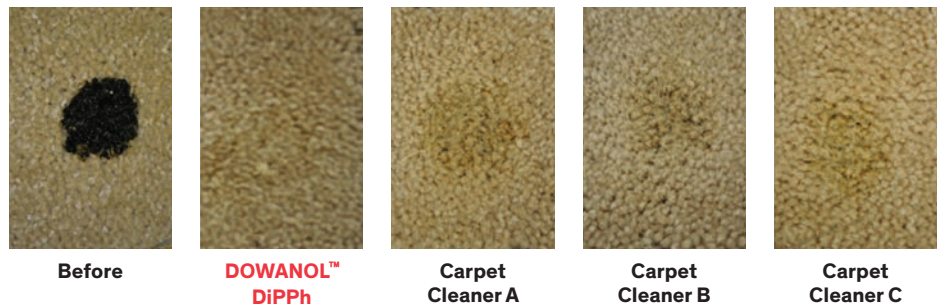


Performance in Carpet Cleaning Formulations

To evaluate its performance in removing greasy, oily stains from carpet, a test formulation was prepared containing 1.25% DOWANOL™ DiPPH Glycol Ether or the same amount of other glycol ethers. In the test, 1 mL of engine oil was allowed to sit on carpet pieces for 25 minutes, and was then treated with the test formulations. As shown in the following chart, DOWANOL™ DiPPH provides similar cleaning performance to Hexyl CELLOSOLVE™ Solvent, and improved performance as compared to the other solvents tested.



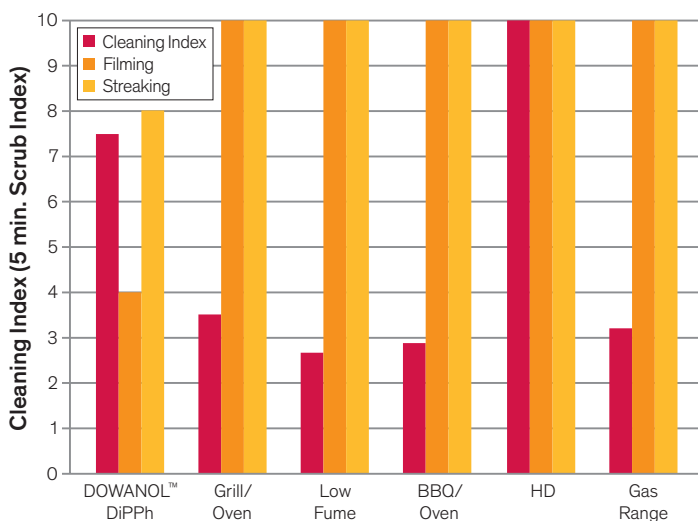
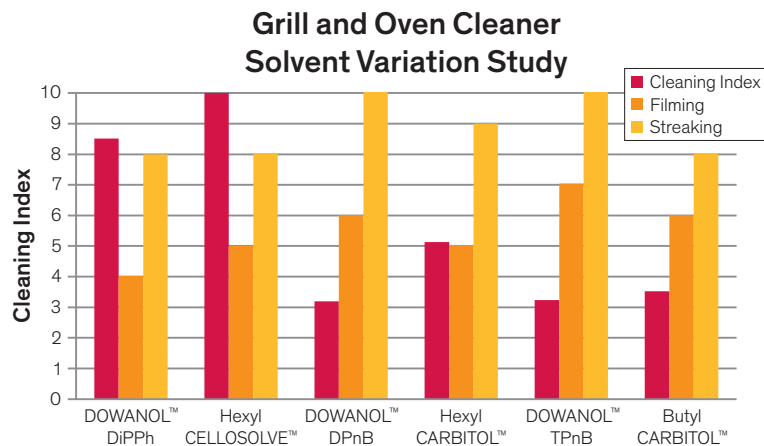
To evaluate the performance of DOWANOL™ DiPPh as compared to commercial carpet cleaners, a similar test was conducted with 1mL of engine oil being allowed to sit on a square of carpet for 25 minutes. As shown in the following photographs, the formulation containing DOWANOL™ DiPPh removed more of the stain than the commercial products.



Performance in Grill and Oven Cleaners

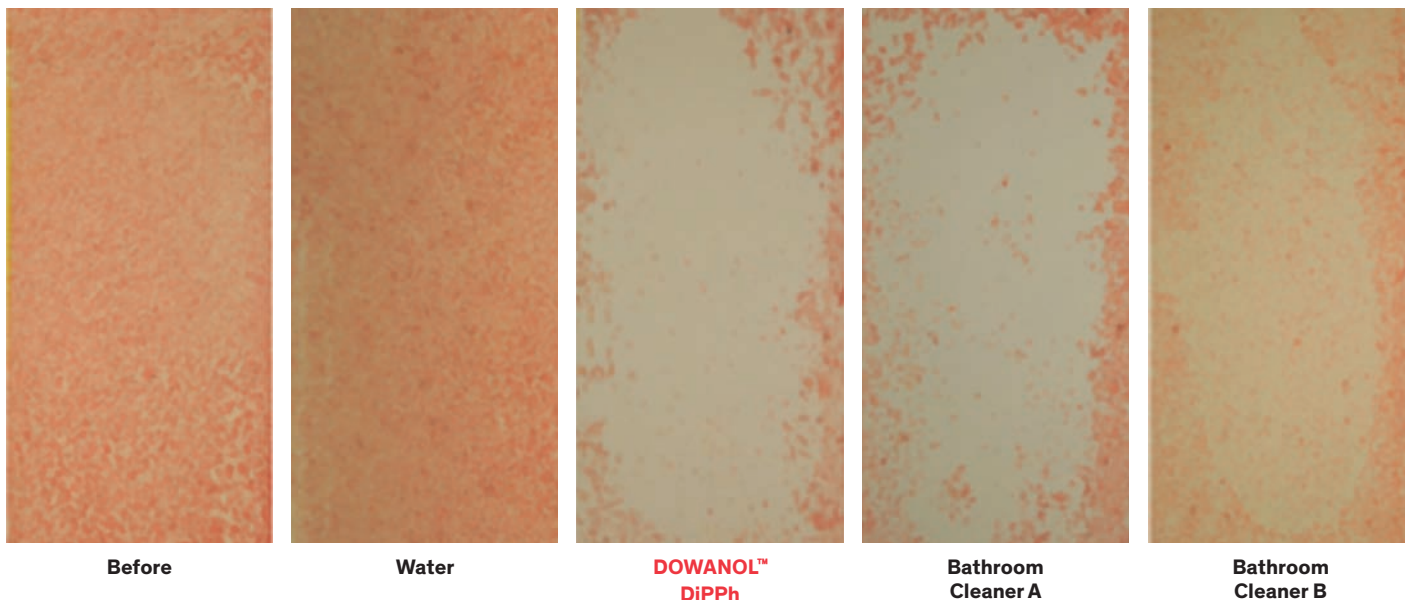
Studies were also conducted to evaluate the performance of DOWANOL™ DiPPH Glycol Ether in grill and oven cleaning formulations. Cleaning formulations were developed containing 2 percent each of the glycol ethers referenced. As shown in the chart on the right, the formulation containing DOWANOL™ DiPPh demonstrated cleaning performance that was comparable to or better than the other glycol ethers tested, with less filming and streaking.

This caustic-free grill/oven cleaner formulation containing DOWANOL™ DiPPh resulted in a final pH of 10.8. As shown by the chart below, this formulation outperformed the cleaning index of the very highly alkaline commercial cleaners tested. The formulation containing DOWANOL™ DiPPh exhibited minimal streaking as opposed to visible white streaks left by the commercially available products.



Performance in Bathroom Cleaners

To evaluate the performance of DOWANOL™ DiPPh Glycol Ether in bathroom cleaner applications, a scrub test was performed using 3 mL of a cleaning solution containing 1 percent DOWANOL™ DiPPh, and equivalent amounts of commercial cleaning products. As shown by the following images, the formulation containing DOWANOL™ DiPPh removed notably more soap scum than the commercial products. Significantly, this formulation containing DOWANOL™ DiPPh was nearly neutral at pH 5.5, while Bathroom Cleaner A was highly alkaline at pH 12.0, and Bathroom Cleaner B was highly acidic at pH 2.0.



Typical Properties

Property	
Molecular Weight (g/mol) (Major Component)	210.2
Boiling Point @ 760 mmHg, 1.01 bar	536°F (280°C)
Flash Point (Pensky-Martens Closed Cup ASTM D 93)	280°F (138°C)
Freezing Point	< -58° F (< -50°C)
Vapor Pressure @ 20°C	< 0.0020 mmHg
Specific Gravity (25°C / 25°C)	1.05130
Density @ 25°C	8.75 lb./gal. (1.04821 g/cc)
Viscosity (cP or mPa.s @ 25°C)	36
Average Hydroxyl Number (mg KOH/g)	284
Surface Tension (dynes/cm or mN/m @ 25°C)	37.700 ±0.054
Specific Heat (J/g/°C @ 25°C)	1.60
Heat of Vaporization (J/g/°C @ 25°C)	402.1
Net Heat of Combustion (kJ/g predicted @ 25°C)	30
Evaporation Rate (n-butyl acetate = 1.0)	0.00023
Partition Coefficient (LogPow)	1.73
Solubility, Wt % @ 25°C	
Solvent in Water	1.5%
Water in Solvent	8.0%
Refractive Index	
@ 20°C	1.579
@ 25°C	1.569
Dielectric Constant @ 25°C	8.43
Hansen Solubility Parameters (J/cc) ^{1/2} (Y-MB method)	
Δd (Dispersion)	17.6
Δp (Polar)	5.9
Δh (Hydrogen bonding)	10.7
Flammable limits (vol. % in air)	
Lower	Not Determined
Upper	Not Determined

(These properties are typical but do not constitute specifications).

For more information about the sample starting formulations and test procedures used to evaluate the performance of DOWANOL™ DiPPh Glycol Ether, please contact your local Dow account representative.



Learn More

While this bulletin can serve as a brief introduction to the home care capabilities of Dow, it cannot begin to anticipate the many questions you may have about how we may help you bring a breakthrough product to light. With that in mind, contact us at the numbers below .

Europe: call toll-free* +800 3 694 6367
call (+32) 3-450-2240 • fax (+32) 3-450-2815

Or you can contact us on the Internet at: www.dow.com

US

Toll Free 800 447 4DOW
989 832 1542

International

Europe / Middle East + 800 36 94 63 67
Italy + 800 783 825
Asia / Pacific + 800 77 76 77 76
+ 60 37 958 3392
South Africa + 800 99 5078

dow.com

®™Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow

Notice: No freedom from infringement of any patent owned by Dow or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, Customer is responsible for determining whether products and the information in this document are appropriate for Customer's use and for ensuring that Customer's workplace and disposal practices are in compliance with applicable laws and other government enactments. The product shown in this literature may not be available for sale and/or available in all geographies where Dow is represented. The claims made may not have been approved for use in all countries. Dow assumes no obligation or liability for the information in this document. References to "Dow" or the "Company" mean the Dow legal entity selling the products to Customer unless otherwise expressly noted. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.