



Kitchen Cleaners

DOWANOL Glycol Ethers Formulary Key Findings

<p>Notable</p>	<ul style="list-style-type: none"> • A 0.1-unit difference in performance is experimentally significant. A 0.3-unit difference is visually noticeable. • Surfactant packages were enhanced as solvents were varied; as more hydrophobic solvents were introduced to the system, a more hydrophilic surfactant package was added to balance the formulation.
<p>All-Purpose/Kitchen Cleaners</p>	<ul style="list-style-type: none"> • At parity levels (5%) of DOWANOL[®] PnB and Butyl CELLOSOLVE™ Solvents, PnB's performance greatly exceeds the performance of Butyl CELLOSOLVE Solvent (1.6 vs. 0.60). • At parity performance (0.9), DOWANOL PnB glycol ether is 15% cheaper than Butyl CELLOSOLVE Solvent. • Actually, at a lower cost (\$0.0313 vs. \$0.0345), DOWANOL PnB glycol ether outperforms Butyl CELLOSOLVE Solvent (0.8 vs. 0.60). • More hydrophobic solvents (DOWANOL PnB and DPnB glycol ethers) work better on the greasy soil used in this method.
<p>Overall</p>	<ul style="list-style-type: none"> • These non-optimized glycol ether formulations perform similarly or better than several leading commercial hard surface cleaners. • P-series glycol ethers are shown to be as -- or even more -- effective at lower cost than E-series glycol ethers. Plus, P-series glycol ethers have favorable toxicology profiles. P-series glycol ethers are not considered to be Hazardous Air Pollutants (HAPs), and they are not subject to the regulations of SARA 313 for annual release reporting requirements.

All-Purpose/Kitchen Cleaners Formulations

Formulations	Performance [^]	Water	DOWANOL PnB	Butyl CELLOSOLVE Solvent	DOWANOL DPnB	Butyl CARBITOL [™] M Solvent	DOWANOL PPh	DOWFAX [*] Detergent	Neodol ² 91-6	DBSA ³	Sodium Silicate	Residue wt. %	Formulation Cost, \$/lb.
1	1.60	91.5	5					1	0.5		2	2.92	0.0435
2	0.90	92.5	4					1	0.5		2	2.92	0.0374
3	0.80	93.5	3					1	0.5		2	2.92	0.0313
4	1.00	92.5	3				1	1	0.5		2	2.92	0.0388
5	0.90	89.4		7.1					0.5	1	2	3.50	0.0438
6	0.60	91.5		5				1	0.5		2	2.92	0.0345
7	1.40	92.5			4			1	0.5		2	2.92	0.0438
8	0.74	93.5			3			1	0.5		2	2.92	0.0361
9	0.48	94.5			2			1	0.5		2	2.92	0.0284
10	0.70	90.5				6			0.5	1	2	3.50	0.0541
11	0.60	92.5				4		1	0.5		2	2.92	0.0402
Commercial A	1.19												
Commercial B	1.17												
Commercial C	0.96												

Commercial D	0.80												
Commercial E	0.76												
Commercial F	0.66												
Commercial G	0.50												
Raw Material Cost, \$/lb.			0.61	0.43	0.77	0.68	0.75	0.74	0.7225	0.765	0.1005		

Formulation amounts expressed in weight %.

^ As compared to a leading commercial all-purpose cleaner as tested by a modified Loth method (described in patent #5,075,026); values > 1.0 indicate the test cleaner outperformed the standard.

A 0.1 unit difference is considered significant; a 0.3-unit difference is visually noticeable.

Prices represented are in U.S. dollars, bulk quantity, Oct. 1997.

* Trademark of The Dow Chemical Company

² Shell Chemical

³ Witco 1298-soft (Witco)

Kitchen Cleaner (Typical Starting Point Formulation)

Component	Percentage (%)
DOWANOL PnB Glycol Ether	4.5 - 5.0
DDBSA, Na Salt	2.0
Tergitol 15-S-12	2.0
Monoethanolamine	1.0
Citric Acid	0.4 - 0.5
Perfume	0.1 - 0.2
Dye	as desired
Water	up to 100

Note:

- 10 > pH < 11
- Citric Acid as pH adjuster
- Low-foam variances: DOWFAX 20B102 surfactant or any Fatty Alcohol Ethoxylate with a cloud point in water close to 30°C
- Nonionic surfactant: Fatty Alcohol Ethoxylate having 12 to 15 carbons
- For stability: Cloud point > 45°C
- generally non-dilutable spray
- outstanding grease-cutting

