



Lab Glove Selection Guide

The purpose of this Guide is to help you choose gloves to protect you from the hazards of chemicals that may contact your skin. It can be used in conjunction with other resources such as agent- or process-specific standard operating procedures to make informed decisions about glove selection.

- This Guide only addresses the chemical protection offered by the gloves. It does not consider other glove performance factors, such as puncture resistance, thermal or cut protection.
- Appropriate contact protection of other skin areas must also be considered when deciding what glove to use.
- The specific products in the Guide have been selected based on available performance data reviewed by EH&S. However, other gloves are available that will provide adequate protection.

Using the following strategies will minimize the risk of hand contact with hazardous chemicals while working in the laboratory.

1. Always use techniques that minimize contact and splashing.
2. Monitor the conditions of your gloves, particularly disposable gloves, and change if contaminated with materials with high contact hazards.
3. Change disposable gloves frequently and wash your hands whenever you remove gloves.
4. Consider double gloving in situations where practical considerations may limit a 'best' glove selection.
5. Reusable gloves provide better forearm protections and puncture resistance and are most appropriate for Contact Protection when working with chemicals that have a Very High or High contact hazard. They are recommended for all work requiring Immersion Protection.
6. Be aware of conditions that may affect your risk of contact hazards and adjust protection as needed:
 - Health of Your Skin: abrasions and open wound may allow absorption of chemicals.
 - Temperature of Chemicals: heated chemicals may permeate faster.
 - Solvent Transport: solvents with low contact hazards may transport higher hazard chemicals, e.g., DMSO and chloroform.

EHS will be continually adding chemicals and glove selections to this Guide. Specific gloves mentioned in Guide should be available in the VWR Stockrooms on each campus by the end of January. In the meantime direct orders can be made from the VWR catalog.

A detailed explanation of the terms used in the Guide are included in the Appendix.

Contact Hazard Color Ranking				
Low	Moderate	High	Very High	
S	Splash Protection	30	Breakthrough Time (Minutes)	
C	Intermittent Contact	NR	Not Recommended	
I	Immersion	ND	No Permeation Data Available	
See the Appendix for More Details				

Lab Glove Selection Guide		Disposable Gloves		
Chemical with Contact Hazard Color Code	CAS#	Microflex 93-260	N-Dex Plus 8005	TouchNTuff 92-600/650
Acetic Acid (99%w/w) {anhydrous, glacial}	64-19-7	S-30	ND	NR
Acetone	67-64-1	S-3	S-6	S-.5
Acetonitrile	75-05-8	S-5	C-15	S-<5
Ammonium Hydroxide (28%w/w)	1336-21-6	S-51	I-480	S-29
Benzene	71-43-2	S-5	S-3	ND
Butanol [n-]	71-36-3	I-434	C-24	I-70
Butanol [Tert-]	75-65-0	ND	ND	ND
Carbon disulfide	75-15-0	S-1	ND	S-<5
Carbon tetrachloride	56-23-5	C-39	C-24	
Chlorobenzene	108-90-7	ND	S-6	ND
Chloroform	67-66-3	S-2	ND	S-.3
Cresols	1319-77-3	ND	ND	ND
Cyclohexane	110-82-7	ND	I-240	I-480
Cyclohexanol	108-93-0	I-480	I-275	ND
Cyclohexanone	108-94-1	S-9	ND	S-<5
Decahydronaphthalene {Decalin}	91-17-8	ND	ND	ND
Dichlorobenzene [o-]	95-50-1	ND	ND	ND
Dichloroethane [1,1-]	75-34-3	ND	ND	ND
Dichloromethane	75-09-2	S-1	S-4	S-<5
Diethylamine	109-89-7	NR	S-10	NR
Dimethoxyethane [1,2-] {Glyme}	110-71-4	ND	ND	ND
Dimethyl sulfoxide	67-68-5	I-93	I-480	S-5
Dimethylformamide [N,N-] {DMF}	68-12-2	S-9	ND	S-<5
Dioxane [1,4-]	123-91-1	ND	C-14	ND
EG monomethyl ether {methyl cellosolve}	109-86-4	ND	S-9	ND
Ethanol	64-17-5	I-66	I-240	S-8
Ethanol (70%w/w)	64-17-5	ND	ND	C-27
Ethyl acetate	141-78-6	S-5	C-14	S-1
Ethyl ether	60-29-7	ND	S-3	S-.4

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Ethylene glycol ether	110-80-5	ND	S-9	ND
Formalin (37 % w/w)	50-00-0	I-480	I-480	I-480
Formic Acid	64-18-6	S-20	ND	ND
Formic Acid (90% w/w)	64-18-6	ND	S-30	ND
Hexamethyphosphoramide {HMPA}	680-31-9	ND	ND	ND
Hexane [n-]	110-54-3	I-280	I-85	I-480
Hydrobromic Acid (49%w/w)	10035-10-6	ND	ND	I-480
Hydrochloric acid (36%w/w)	7647-01-0	I-480	I-480	S-51
Hydrofluoric Acid (10% w/w)	7664-39-3	ND	ND	S-13
Hydrofluoric Acid (48% w/w)	7664-39-3	ND	S-50	NR
Hydrogen Peroxide(30%w/w)	7722-84-1	I-480	I-480	C-41
Isoamyl acetate	123-92-2	ND	S-7	ND
Isobutanol	78-83-1	ND	I-70	ND
Isobutyl acetate	110-19-0	ND	ND	ND
Isopropanol	67-63-0	I-204	I-240	I-117
Methanol	67-56-1	C-21	C-13	S-1
Methoxymethyl ether [bis(2-)]{Diglyme}	111-96-6	ND	ND	ND
Methyl acetate	79-20-9	ND	S-3	ND
Nitric Acid (23%w/w)	7697-37-2	ND	I-480	ND
Nitric Acid (50%w/w)	7697-37-2	ND	ND	S-9
Nitric Acid (65%w/w)	7697-37-2	S-30	ND	ND
Nitric Acid (70%w/w)	7697-37-2	ND	ND	NR
Nitrobenzene	98-95-3	ND	S-9	ND
Nitromethane	75-52-5	ND	S-5	ND
Pentane [n-]	109-66-0	ND	C-59	ND
Perchloric Acid (70%w/w)	7601-90-3	ND	ND	ND
Petroleum Ether	8032-32-4	ND	I-240	ND

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Phenol	108-95-2	ND	S-10	ND
PhenolChloroform (25;24:1)	NA	ND	ND	ND
Phosphoric Acid (85% w/w)	7664-38-2	I-480	I-480	ND
Potassium Hydroxide (45% w/w)	1310-58-3	ND	I-480	ND
Pyridine	110-86-1	ND	ND	ND
Sodium Hydroxide (40-50%w/w)	1310-73-2	I-480	I-480	I-480
Styrene	100-42-5	ND	S-6	ND
Sulfuric Acid (96%w/w)	7664-93-6	S-49	ND	NR
Tetrahydrofuran	109-99-9	S-2	ND	S- <5
Thionyl chloride	7719-07-9	ND	ND	ND
Toluene	108-88-3	S-6	ND	S-1
Triethylamine	121-44-8	I-342	ND	C-155
Trimethylbenzene [1,3,5-] {Mesitylene}	108-67-8	ND	ND	ND
Trimethylpentane [2,2,4-] {Isooctane}	540-84-1	ND	ND	ND
Xylene Mixture	1330-20-7	C-11	C-11	S- <5

Appendix: Procedure for Creating Glove Selection Guide

Determining the Chemical Contact Hazard Ranking

Acute toxicity, direct skin effects, and systemic effects from skin absorption are considered when assigning a chemical a contact hazard level. Chemicals may have other health or physical hazards that also need to be controlled by other methods. However, when selecting gloves for chemical protection, it is only necessary to consider their contact hazards.

The Safety Data Sheet (in the current GHS or globally harmonized system format) are useful for acute toxicity and direct skin effects, but other sources may be required to evaluate the significance of systemic effects and absorption. The table below summarizes the process for determining the Contact Hazard of a chemical.

Contact Hazard Ranking	Hazard Properties	GHS Hazard Statements (examples)
Very High	High acute toxicity AND can move through the skin	Fatal if in contact with the skin
High	Cause immediate damage to skin	Causes severe skin burns
Moderate	Moderate acute toxicity or serious chronic effects AND can move through the skin.	Toxic in contact with the skin May Cause Cancer
Low	No Skin Hazard Skin Irritation AND cannot move through the skin.	Causes skin irritation

Determining the Glove Performance Rating

The Performance rating is primarily based upon Breakthrough Time for the glove materials. Breakthrough times are usually determined under conditions of constant contact under pressure and may underestimate performance in laboratories. Where manufacturers provide breakthrough times specifically based on intermittent contact testing, these values are used. The gloves included in the Glove Selection Guide have readily available permeation data that EHS has reviewed.

Glove Performance Rating	Breakthrough Time (min)
Excellent	>240
Good	60-240
Fair	10-60
Poor	<10

Determining the Glove Protection Level

The Protection Levels consider the likelihood and amount of contact that is likely to occur. By looking at the amounts of chemicals you use and how they are manipulated, three Protection Levels are defined as following,

1. **Splash (S):** Procedures that only require contact with containers and not their content, but offer some risk of small scale contamination due to splashing. The risk of these 'splashes' generally increase, when larger amounts and containers are used and decanted.
2. **Intermittent Contact (C):** Procedures where it is expected that occasional short-term (1-5 minutes) contact of the glove with chemicals or wetted parts may occur. Acid etching and cleaning procedures are a good example of these. It also applies to situations where splashing is more likely such as spraying or working with boiling solvents.
3. **Full Immersion (I):** Procedures that require either periods of extended immersion of most of the glove or frequent intermittent contact over an extended period. This type of protection is more commonly associated with industrial than laboratory settings.

The Glove Protection Level can be determined by using the matrix below. Given the contact hazard of the chemical and the performance of the glove a maximum protection level can be determined by using the appropriate row (Glove Performance Rating) and column (Contact Hazard).

Glove Performance	Contact Hazard of Chemical			
	Low	Medium	High	Very High
Poor	Splash	Splash	NA	NA
Fair	Splash/Contact	Splash/Contact	Splash	NA
Good	Splash/Contact/Immersion	Splash/Contact/Immersion	Splash/Contact	Splash/Contact
Excellent	Splash/Contact/Immersion	Splash/Contact/Immersion	Splash/Contact/Immersion	Splash/Contact/Immersion