HARVARD
Campus Services
ENVIRONMENTAL HEALTH & SAFETY

Lab Glove Selection Guide

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Overview

The Lab Glove Selection Guide helps you choose gloves to protect your skin from chemical contact hazards. Use this guide along with agent-specific or process-specific standard operating procedures (SOP).

This guide addresses glove chemical protection and doesn't consider other performance factors such as puncture resistance, cut protection, or thermal protection. Also consider other appropriate personal protective equipment (PPE) such as lab coats or eye protection when choosing gloves.

The glove selection is based on product performance data reviewed by the Environmental Health and Safety Office (EHS). Other gloves providing adequate protection are also available. Please reach out to your Lab Safety Advisor if assistance is needed in selecting gloves for specific processes and chemicals.

Minimizing Hand and Hazardous Chemical-Contact Risks in Labs

- Always use techniques that minimize contact and splashing.
- Monitor glove condition, especially disposable gloves, and change gloves if they are damaged or contaminated with high contact hazard materials.
- Change disposable gloves often and wash hands after removing gloves.
- Consider double gloving in situations where practical considerations may limit the best glove selection.
- Reusable gloves are made from durable materials and can be cleaned and used multiple times. Examples include heavy-duty nitrile, neoprene, or butyl rubber gloves.
    - Reusable gloves provide better forearm protection and puncture resistance and are the most appropriate gloves for very high or high contact hazardous chemical contact protection.
    - Reusable gloves are recommended for all work requiring immersion protection.
- Be aware of conditions that may affect a chemical's contact hazard risk and adjust glove selection as needed.
    - **Skin health:** Abrasions and open wounds may allow for increased absorption of chemicals.
    - **Chemical temperature:** Heated chemicals may permeate faster.
    - **Solvent transport:** Solvents with low contact hazards, such as dimethyl sulfoxide (DMSO), may transport higher hazard chemicals across the skin barrier, increasing risk.

EHS continually updates this guide's chemicals and glove selection.

Glove Selection Guide Key

Chemical Contact Hazard Rankings

Acute toxicity, direct skin effects, and systemic effects from skin absorption are considered when assigning chemical contact hazard levels. Chemicals may have other health or physical hazards that must be controlled

by other methods, but it's only necessary to consider contact hazards when selecting gloves for chemical protection.

Safety Data Sheets (SDS) help determine acute toxicity and direct skin effects, but other sources may be required to evaluate the significance of systemic effects and absorption.

The chemicals listed in the glove selection guide are color coded based on the level of hazard posed by contact with the chemicals. These rankings are also written out in the Contact Hazard Ranking column of the Glove Selection Guide table.

Hazard Level	Color	GHS Hazard Statement Examples	Hazard Properties
Low	Green	Causes skin irritation.	No skin hazards. Skin irritation. Can't move through the skin.
Medium	Yellow	Toxic in contact with the skin. May cause cancer.	Moderate acute toxicity or serious chronic effects. Can move through the skin.
High	Orange	Causes severe skin burns.	Cause immediate damage to skin.
Very High	Red	Fatal if in contact with the skin.	High acute toxicity. Can move through the skin.

Glove Protection Levels and Constraints

The glove protection levels based on the type of contact with chemicals, and other constraints such as the tested breakthrough time, are noted for each glove type. Glove protection levels consider the likelihood and estimated amount of chemical contact on gloves. The chemical amounts, uses, and how they are manipulated define the glove protection level.

Abbreviation	Protection Level	Description
C	Intermittent contact	Procedures where occasional short-term contact, typically one to five minutes, of gloves with chemicals or wetted parts may occur. Examples are contact during acid etching or cleaning procedures. Intermittent contact also applies to situations where splashing is more likely, such as spraying or working with boiling solvents.
I	Immersion	Procedures that require either periods of extended glove immersion or frequent intermittent contact over an extended period. Full immersion protection is more commonly associated with industrial settings than lab settings.
S	Splash	Procedures that only require contact with containers and not their contents, but risk small-scale contamination due to splashing. The splash risk increases when using and decanting larger amounts and containers.
ND	No permeation data available	There is no direct information regarding the protection provided.
NR	Not recommended	Due to rapid permeation the glove is not recommended for most uses of the listed chemical.

The breakthrough time in minutes is indicated for the S, C, and I levels of protection.

For instance, acetic acid (99%w/w) {anhydrous, glacial} poses a high hazard from any contact and has the following glove protection levels:

- The Ansell Microflex 93-260 glove is S-30, providing 30 minutes of protection for activities that could involve splashing but don't involve intermittent contact with or immersion in that chemical.
- The Ansell Microflex Midnight 93-852 glove is ND, showing that no permeation data is available for that chemical.
- The Ansell TouchNTuff 92-600 glove is NR, showing it isn't recommended for use with that chemical.

See Glove Selection Determination for more details on guide terminology.

Disposable Glove Options

Information on chemical resistance is provided for three disposable glove options. Check with the manufacturer for information on other gloves or reach out to EHS for assistance.

Glove Type	Materials
Ansell Microflex 93-260	Nitrile and neoprene (7.9 mil)
Ansell Microflex MidKnight 93-852	Nitrile (4.3-5.9 mil)
Ansell TouchNTuff 92-600	Nitrile (4.9-5.5 mil)

Glove Selection Guide

Chemical[1]	Contact Hazard Ranking	CAS[2]	Ansell Microflex 93-260	Ansell Microflex MidKnight 93-852	Ansell TouchNTuff 92-600
Acetic acid (99%w/w) {anhydrous, glacial}	High	64-19-7	S-30	ND	NR
Acetone	Low	67-64-1	S-3	S-1	S-0.5
Acetonitrile	Low	75-05-8	S-5	S- <1	S-<5
Ammonium hydroxide (28%w/w)	High	1336-21-6	S-51	ND	S-29
Benzene	Medium	71-43-2	S-5	ND	ND
Butanol [n-]	Low	71-36-3	I-434	ND	I-70
Carbon disulfide	Medium	75-15-0	S-1	ND	S-<5
Carbon tetrachloride[3]	Medium	56-23-5	C-30	ND	ND

[1] With contact hazard ranking color code.

[2] Chemical Abstracts Service (CAS) registry numbers uniquely identify each chemical. This is useful for cases when a chemical is known by multiple names.

[3] At a minimum, double-glove with nitrile or nitrile and neoprene combination gloves such as Ansell Microflex 93-260 when performing low-risk work with carbon tetrachloride, dichloromethane (methylene chloride), or perchloroethylene. Immediately remove the gloves if they become contaminated. For work with larger

Chemical[1]	Contact Hazard Ranking	CAS[2]	Ansell Microflex 93-260	Ansell Microflex MidKnight 93-852	Ansell TouchNTuff 92-600
Chloroform	Medium	67-66-3	S-2	ND	S-0.3
Cyclohexane	Low	110-82-7	ND	ND	I-480
Cyclohexanol	Medium	108-93-0	I-480	ND	ND
Cyclohexanone	Medium	108-94-1	S-9	ND	S-<5
Dichloromethane[3] {DCM, methylene chloride}	Medium	75-09-2	S-1	ND	S-<5
Diethylamine	High	109-89-7	NR	S- <1	NR
Dimethylformamide [N,N-] {DMF}	Medium	68-12-2	S-9	ND	S-<5
DMSO	Low	67-68-5	I-93	S-10	S-5
Ethylene glycol monomethyl ether {methyl cellosolve}	Medium	109-86-4	ND	S-<1	ND
Ethanol	Low	64-17-5	I-66	S-5	S-8
Ethanol (70%w/w)	Low	64-17-5	ND	S-11	C-27

volumes or where there is a greater splash hazard, use a more resistant glove such as Ansell 2-100 liners under a nitrile or nitrile and neoprene combination glove.

Chemical[1]	Contact Hazard Ranking	CAS[2]	Ansell Microflex 93-260	Ansell Microflex MidKnight 93-852	Ansell TouchNTuff 92-600
Ethyl acetate	Low	141-78-6	S-5	S-<1	S-1
Ethyl ether	Low	60-29-7	ND	ND	S-0.4
Ethylene glycol monoethyl ether	Medium	110-80-5	ND	S- <1	ND
Formalin (37 % w/w)	High	50-00-0	I-480	S-395	I-480
Formic Acid	High	64-18-6	S-20	ND	ND
Hexane [n-]	Medium	110-54-3	I-280	ND	I-480
Hydrobromic Acid (49%w/w)	High	10035-10-6	ND	ND	I-480
Hydrochloric acid (36%w/w)	High	7647-01-0	I-480	S-60	S-51
Hydrofluoric Acid (10% w/w)	High	7664-39-3	ND	ND	S-13
Hydrofluoric acid (48% w/w)	Very High	7664-39-3	ND	ND	NR
Hydrogen peroxide (30%w/w)	Low	7722-84-1	I-480	S- >480	C-41
Isopropanol	Low	67-63-0	I-204	S->480	I-117
Methanol	Medium	67-56-1	C-21	S-<1	S-1

Chemical[1]	Contact Hazard Ranking	CAS[2]	Ansell Microflex 93-260	Ansell Microflex MidKnight 93-852	Ansell TouchNTuff 92-600
Nitric acid (50%w/w)	High	7697-37-2	ND	ND	S-9
Nitric acid (65%w/w)	High	7697-37-2	S-30	ND	ND
Nitric acid (70%w/w)	High	7697-37-2	ND	S- <1	NR
Perchloroethylene[3]	Medium	127-18-4	C-60	ND	ND
Petroleum ether	Low	8032-32-4	ND	ND	ND
Phenol	High	108-95-2	ND	ND	ND
Phosphoric acid (85% w/w)	High	7664-38-2	I-480	ND	ND
Sodium hydroxide (40-50%w/w)	High	1310-73-2	I-480	S->480	I-480
Sulfuric acid (96%w/w)	High	7664-93-6	S-49	S-10	NR
Tetrahydrofuran	Medium	109-99-9	S-2	ND	S- <5
Toluene	Low	108-88-3	S-6	S-<1	S-1
Triethylamine	High	121-44-8	I-342	S-6	C-155
Xylene mixture	Low	1330-20-7	C-11	ND	S-<5

Glove Selection Determination

Glove performance rating for a chemical is based primarily on the glove material's breakthrough time. EHS reviews the readily available permeation data for all Glove Selection Guide gloves. Breakthrough time indicates the amount of time it takes for a chemical to migrate from glove outside surfaces to inside surfaces where they can contact the skin. Breakthrough times are usually determined under conditions of constant contact under pressure and may underestimate performance in labs. Manufacturer-provided breakthrough times based on intermittent contact testing are used when available.

Use a combination of a glove's performance rating with a specific chemical and that chemical's contact hazard ranking to choose the appropriate glove. Refer to this matrix to identify the maximum protection level based on these two factors.

Glove Performance Rating (Breakthrough Time)	**Low Contact Hazard**	**Medium Contact Hazard**	**High Contact Hazard**	**Very High Contact Hazard**
Poor (Less than 10 minutes)	Splash	Splash	N/A	N/A
Fair (10 to 60 minutes)	Splash/contact	Splash/contact	Splash	N/A
Good (60 to 240 minutes)	Splash/contact/ immersion	Splash/contact/ immersion	Splash/contact	Splash/contact
Excellent (Greater than 240 minutes)	Splash/contact/ immersion	Splash/contact/ immersion	Splash/contact/ immersion	Splash/contact/ immersion

As an example, 36% hydrochloric acid has a high contact hazard. Gloves such as the Microflex MidKnight 93-852, which are rated for splash protection only, may be acceptable for low-risk tasks. Select a glove like the Ansell Microflex 93-260 when there is a greater splash risk.