




# PERMA PURE LLC

1001 NEW HAMPSHIRE AVE  
LAKEWOOD, NEW JERSEY 08701  
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The permeability information presented in this list is determined through detailed analysis of Nafion's chemical structure and its anticipated reactivity with each compound, based on established chemical knowledge. These predictions rely on the principles of polymer chemistry and known chemical interactions, rather than direct experimental measurements.

This data provides directional guidance for evaluating permeation risk. Users should validate critical applications with empirical testing under real-world conditions.

| Nafion™ Tubing<br>Chemical Compatibility |                          |                   |            |  |
|--|--------------------------|-------------------|------------|---|
| Chemical Family                          | Chemical Name            | Chemical Code     | CAS Number | Retention Classification  |
| Acid Gases                               | Acetic Acid              | $C_2H_4O_2$       | 64-19-7    | Significant Loss  |
|  | Boron Trifluoride        | $BF_3$            | 7637-07-2  | Fully Retained  |
|  | Formic Acid              | $HCOOH$           | 64-18-6    | Partially Retained  |
|  | Hydrogen Bromide         | $HBr$             | 10035-10-6 | Fully Retained  |
|  | Hydrogen Chloride        | $HCl$             | 7647-01-0  | Fully Retained  |
|  | Hydrogen Fluoride        | $HF$              | 7664-39-3  | Fully Retained  |
|  | Hydrogen Iodide          | $HI$              | 10034-85-2 | Fully Retained  |
|  | Isovaleric Acid          | $C_5H_{10}O_2$    | 503-74-2   | Partially Retained  |
|  | Nitric Acid (Vapor)      | $HNO_3$           | 7697-37-2  | Fully Retained  |
|  | Phosphoric Acid (Vapor)  | $H_3PO_4$         | 7664-38-2  | Fully Retained  |
|  | Propionic Acid           | $CH_3CH_2COOH$    | 79-09-4    | Partially Retained  |
|  | Sulfur Dioxide           | $SO_2$            | 7446-09-5  | Fully Retained  |
|  | Sulfur Trioxide          | $SO_3$            | 7446-11-9  | Fully Retained  |
|  | Sulfuric Acid (Vapor)    | $H_2SO_4$         | 7664-93-9  | Fully Retained  |
| Alcohols                                 | 1-Butanol                | $C_4H_9OH$        | 71-36-3    | Significant Loss  |
|  | 1-Hexanol                | $C_6H_{13}OH$     | 111-27-3   | Significant Loss  |
|  | 1-Pentanol               | $C_5H_{11}OH$     | 71-41-0    | Significant Loss  |
|  | 1-Propanol               | $C_3H_7OH$        | 71-23-8    | Significant Loss  |
|  | 2-Butanol                | $C_4H_9OH$        | 78-92-2    | Significant Loss  |
|  | 2-Pentanol               | $C_5H_{11}OH$     | 6032-29-7  | Significant Loss  |
|  | 2-Propanol (Isopropanol) | $(CH_3)_2CHOH$    | 67-63-0    | Significant Loss  |
|  | Benzyl Alcohol           | $C_6H_5CH_2OH$    | 100-51-6   | Significant Loss  |
|  | Cyclohexanol             | $C_6H_{11}OH$     | 108-93-0   | Significant Loss  |
|  | Ethanol                  | $C_2H_5OH$        | 64-17-5    | Significant Loss  |
|  | Methanol                 | $CH_3OH$          | 67-56-1    | Significant Loss  |
|  | Tert-Butanol             | $(CH_3)_3COH$     | 75-65-0    | Significant Loss  |
| Aldehydes                                | Acetaldehyde             | $CH_3CHO$         | 75-07-0    | Partially Retained  |
|  | Acrolein                 | $C_3H_4O$         | 107-02-8   | Partially Retained  |
|  | Benzaldehyde             | $C_6H_5CHO$       | 100-52-7   | Partially Retained  |
|  | Butyraldehyde            | $C_4H_7CHO$       | 123-72-8   | Partially Retained  |
|  | Crotonaldehyde           | $C_4H_6O$         | 123-73-9   | Significant Loss  |
|  | Formaldehyde             | $HCHO$            | 50-00-0    | Partially Retained  |
|  | Hexanal                  | $C_6H_{12}O$      | 66-25-1    | Partially Retained  |
|  | Propionaldehyde          | $C_3H_6O$         | 123-38-6   | Partially Retained  |
|  | Valeraldehyde            | $C_5H_{10}O$      | 110-62-3   | Partially Retained  |
| Amides                                   | Dimethylacetamide        | $CH_3CON(CH_3)_2$ | 127-19-5   | Significant Loss  |
|  | Dmf                      | $HCON(CH_3)_2$    | 68-12-2    | Significant Loss  |



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|--------------------------|-----------------------|-------------------------|-----------|--------------------|
| Amines                   | Aniline               | $C_6H_5NH_2$            | 62-53-3   | Partially Retained |
|                          | Butylamine            | $C_4H_9NH_2$            | 109-73-9  | Partially Retained |
|                          | Diethylamine          | $(C_2H_5)_2NH$          | 109-89-7  | Partially Retained |
|                          | Dimethylamine         | $(CH_3)_2NH$            | 124-40-3  | Partially Retained |
|                          | Ethylamine            | $C_2H_5NH_2$            | 75-04-7   | Partially Retained |
|                          | Methylamine           | $CH_3NH_2$              | 74-89-5   | Partially Retained |
|                          | Propylamine           | $C_3H_7NH_2$            | 107-10-8  | Partially Retained |
|                          | Pyridine              | $C_5H_5N$               | 110-86-1  | Partially Retained |
|                          | Triethylamine         | $(C_2H_5)_3N$           | 121-44-8  | Partially Retained |
|                          | Trimethylamine        | $(CH_3)_3N$             | 75-50-3   | Partially Retained |
| Aromatics (Hydrocarbons) | Anisole               | $C_7H_8O$               | 100-66-3  | Fully Retained     |
|                          | Anthracene            | $C_{14}H_{10}$          | 120-12-7  | Fully Retained     |
|                          | Benzene               | $C_6H_6$                | 71-43-2   | Fully Retained     |
|                          | Cumene                | $C_6H_5CH(CH_3)_2$      | 98-82-8   | Fully Retained     |
|                          | Ethylbenzene          | $C_6H_5C_2H_5$          | 100-41-4  | Fully Retained     |
|                          | Isopropyl Benzene     | $C_6H_5CH(CH_3)_2$      | 98-82-8   | Fully Retained     |
|                          | Mesitylene            | $C_6H_3(CH_3)_3$        | 108-67-8  | Fully Retained     |
|                          | Naphthalene           | $C_{10}H_8$             | 91-20-3   | Fully Retained     |
|                          | Styrene               | $C_6H_5CH=CH_2$         | 100-42-5  | Fully Retained     |
|                          | Toluene               | $C_6H_5CH_3$            | 108-88-3  | Fully Retained     |
|                          | Xylene (M-Isomer)     | $C_6H_4(CH_3)_2$        | 108-38-3  | Fully Retained     |
|                          | Xylene (O-Isomer)     | $C_6H_4(CH_3)_2$        | 95-47-6   | Fully Retained     |
|                          | Xylene (P-Isomer)     | $C_6H_4(CH_3)_2$        | 106-42-3  | Fully Retained     |
| Basic gases              | Ammonia               | $NH_3$                  | 7664-41-7 | Partially Retained |
|                          | Ammonium Hydroxide    | $NH_4OH$                | 1336-21-6 | Significant Loss   |
|                          | Hydrazine             | $N_2H_4$                | 302-01-2  | Partially Retained |
|                          | Methylhydrazine       | $CH_3NHNH_2$            | 60-34-4   | Partially Retained |
| Diatomic Gases           | Fluorine              | $F_2$                   | 7782-41-4 | Fully Retained     |
|                          | Hydrogen              | $H_2$                   | 1333-74-0 | Fully Retained     |
|                          | Nitrogen              | $N_2$                   | 7727-37-9 | Fully Retained     |
|                          | Oxygen                | $O_2$                   | 7782-44-7 | Fully Retained     |
| Esters                   | Amyl Acetate          | $CH_3COOC_5H_{11}$      | 628-63-7  | Fully Retained     |
|                          | Butyl Acetate         | $CH_3COOC_4H_9$         | 123-86-4  | Fully Retained     |
|                          | Ethyl Acetate         | $CH_3COOC_2H_5$         | 141-78-6  | Partially Retained |
|                          | Isobutyl Acetate      | $CH_3COOCH_2CH(CH_3)_2$ | 110-19-0  | Significant Loss   |
|                          | Methyl Acetate        | $CH_3COOCH_3$           | 79-20-9   | Fully Retained     |
|                          | Methyl Methacrylate   | $C_5H_8O_2$             | 80-62-6   | Fully Retained     |
|                          | Propyl Acetate        | $CH_3COOC_3H_7$         | 109-60-4  | Fully Retained     |
| Ethers                   | 1,4-Dioxane           | $C_4H_8O_2$             | 123-91-1  | Significant Loss   |
|                          | Diethyl Carbitol      | $(C_2H_5OCH_2CH_2)_2O$  | 112-36-7  | Partially Retained |
|                          | Diethyl Ether         | $C_2H_5OC_2H_5$         | 60-29-7   | Fully Retained     |
|                          | Diisopropyl Ether     | $(CH_3)_2CHOCH(CH_3)_2$ | 108-20-3  | Fully Retained     |
|                          | Dimethyl Ether        | $CH_3OCH_3$             | 115-10-6  | Fully Retained     |
|                          | Ethyl Ether           | $(C_2H_5)_2O$           | 60-29-7   | Significant Loss   |
|                          | Ethyl Methyl Ether    | $CH_3OC_2H_5$           | 540-67-0  | Fully Retained     |
|                          | Tetrahydrofuran (Thf) | $C_4H_8O$               | 109-99-9  | Significant Loss   |



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| Fluorinated Hydrocarbons | Chlorodifluoromethane | CHClF <sub>2</sub>  | 75-45-6   | Fully Retained   |
|                          | Difluoromethane       | CH <sub>2</sub> F <sub>2</sub>                                    | 75-10-5   | Fully Retained   |
|                          | Hexafluoroethane      | C <sub>2</sub> F <sub>6</sub>                                     | 76-16-4   | Fully Retained   |
|                          | Tetrafluoromethane    | CF <sub>4</sub>   | 75-73-0   | Fully Retained   |
|                          | Trifluoroethane       | C <sub>2</sub> H <sub>5</sub> F <sub>3</sub>                      | 420-46-2  | Fully Retained   |
| Halogenated Hydrocarbons | 1,2-Dichloroethane    | C <sub>2</sub> H <sub>4</sub> Cl <sub>2</sub>                     | 107-06-2  | Fully Retained   |
|                          | Bromobenzene          | C <sub>6</sub> H <sub>5</sub> Br                                  | 108-86-1  | Fully Retained   |
|                          | Bromoform             | CHBr <sub>3</sub>   | 75-25-2   | Fully Retained   |
|                          | Bromomethane          | CH <sub>3</sub> Br  | 74-83-9   | Fully Retained   |
|                          | Chlorobenzene         | C <sub>6</sub> H <sub>5</sub> Cl                                  | 108-90-7  | Fully Retained   |
|                          | Chloroethane          | C <sub>2</sub> H <sub>5</sub> Cl                                  | 75-00-3   | Fully Retained   |
|                          | Chloroform            | CHCl <sub>3</sub>   | 67-66-3   | Fully Retained   |
|                          | Chloromethane         | CH <sub>3</sub> Cl  | 74-87-3   | Fully Retained   |
|                          | Dichloromethane       | CH <sub>2</sub> Cl <sub>2</sub>                                   | 75-09-2   | Fully Retained   |
|                          | Fluorobenzene         | C <sub>6</sub> H <sub>5</sub> F                                   | 462-06-6  | Fully Retained   |
|                          | Fluoromethane         | CH <sub>3</sub> F   | 593-53-3  | Fully Retained   |
|                          | Iodomethane           | CH <sub>3</sub> I   | 74-88-4   | Fully Retained   |
|                          | Methyl Bromide        | CH <sub>3</sub> Br  | 74-83-9   | Fully Retained   |
|                          | Methyl Chloride       | CH <sub>3</sub> Cl  | 74-87-3   | Fully Retained   |
|                          | Phosgene              | COCl <sub>2</sub>   | 75-44-5   | Fully Retained   |
|                          | Tetrachloroethylene   | C <sub>2</sub> Cl <sub>4</sub>                                    | 127-18-4  | Fully Retained   |
|                          | Trichloroethylene     | C <sub>2</sub> HCl <sub>3</sub>                                   | 79-01-6   | Fully Retained   |
|                          | Trichloroethene (Tce) | C <sub>2</sub> HCl <sub>3</sub>                                   | 79-01-6   | Fully Retained   |
| Halogens                 | Bromine               | Br <sub>2</sub>   | 7726-95-6 | Fully Retained   |
|                          | Chlorine              | Cl <sub>2</sub>   | 7782-50-5 | Fully Retained   |
|                          | Fluorine              | F <sub>2</sub>  | 7782-41-4 | Significant Loss |
|                          | Iodine                | I <sub>2</sub>  | 7553-56-2 | Fully Retained   |
| Hydrocarbons - Alkanes   | Cyclohexane           | C <sub>6</sub> H <sub>12</sub>                                    | 110-82-7  | Fully Retained   |
|                          | Ethane                | C <sub>2</sub> H <sub>6</sub>                                     | 74-84-0   | Fully Retained   |
|                          | Isobutane             | (CH <sub>3</sub> ) <sub>2</sub> CHCH <sub>3</sub>                 | 75-28-5   | Fully Retained   |
|                          | Isopentane            | (CH <sub>3</sub> ) <sub>2</sub> CHCH <sub>2</sub> CH <sub>3</sub> | 78-78-4   | Fully Retained   |
|                          | Methane               | CH <sub>4</sub>   | 74-82-8   | Fully Retained   |
|                          | N-Butane              | C <sub>4</sub> H <sub>10</sub>                                    | 106-97-8  | Fully Retained   |
|                          | N-Decane              | C <sub>10</sub> H <sub>22</sub>                                   | 124-18-5  | Fully Retained   |
|                          | Neopentane            | C(CH <sub>3</sub> ) <sub>4</sub>                                  | 463-82-1  | Fully Retained   |
|                          | N-Heptane             | C <sub>7</sub> H <sub>16</sub>                                    | 142-82-5  | Fully Retained   |
|                          | N-Hexane              | C <sub>6</sub> H <sub>14</sub>                                    | 110-54-3  | Fully Retained   |
|                          | N-Nonane              | C <sub>9</sub> H <sub>20</sub>                                    | 111-84-2  | Fully Retained   |
|                          | N-Octane              | C <sub>8</sub> H <sub>18</sub>                                    | 111-65-9  | Fully Retained   |
|                          | N-Pentane             | C <sub>5</sub> H <sub>12</sub>                                    | 109-66-0  | Fully Retained   |
|                          | Propane               | C <sub>3</sub> H <sub>8</sub>                                     | 74-98-6   | Fully Retained   |



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|------------------------|-------------------------------|------------------------|------------|--------------------|
| Hydrocarbons – Alkenes | 1-Butene                      | $C_4H_8$               | 106-98-9   | Fully Retained     |
|                        | 1-Hexene                      | $C_6H_{12}$            | 592-41-6   | Fully Retained     |
|                        | 1-Pentene                     | $C_5H_{10}$            | 109-67-1   | Fully Retained     |
|                        | 2-Butene (Cis)                | $C_4H_8$               | 590-18-1   | Fully Retained     |
|                        | 2-Butene (Trans)              | $C_4H_8$               | 624-64-6   | Fully Retained     |
|                        | 2-Pentene (Cis)               | $C_5H_{10}$            | 627-20-3   | Fully Retained     |
|                        | 2-Pentene (Trans)             | $C_5H_{10}$            | 646-04-8   | Fully Retained     |
|                        | Cyclohexene                   | $C_6H_{10}$            | 110-83-8   | Fully Retained     |
|                        | Ethylene                      | $C_2H_4$               | 74-85-1    | Fully Retained     |
|                        | Isobutene                     | $(CH_3)_2C=CH_2$       | 115-11-7   | Fully Retained     |
|                        | Propene                       | $C_3H_6$               | 115-07-1   | Fully Retained     |
|                        | Propylene                     | $C_3H_6$               | 115-07-1   | Fully Retained     |
| Hydrocarbons – Alkynes | 1-Butyne                      | $C_4H_6$               | 107-00-6   | Partially Retained |
|                        | 1-Pentyne                     | $C_5H_8$               | 627-19-0   | Partially Retained |
|                        | 2-Butyne                      | $C_4H_6$               | 503-17-3   | Partially Retained |
|                        | Acetylene                     | $C_2H_2$               | 74-86-2    | Partially Retained |
|                        | Propyne                       | $C_3H_4$               | 74-99-7    | Partially Retained |
| Inert Gases            | Argon                         | Ar                     | 7440-37-1  | Fully Retained     |
|                        | Helium                        | He                     | 7440-59-7  | Fully Retained     |
|                        | Krypton                       | Kr                     | 7439-90-9  | Fully Retained     |
|                        | Neon                          | Ne                     | 7440-01-9  | Fully Retained     |
|                        | Water                         | $H_2O$                 | 7732-18-5  | Significant Loss   |
|                        | Xenon                         | Xe                     | 7440-63-3  | Fully Retained     |
| Ketones                | Acetone                       | $CH_3COCH_3$           | 67-64-1    | Significant Loss   |
|                        | Acetophenone                  | $C_6H_5COCH_3$         | 98-86-2    | Partially Retained |
|                        | Cyclohexanone                 | $C_6H_{10}O$           | 108-94-1   | Partially Retained |
|                        | Diacetyl                      | $C_4H_6O_2$            | 431-03-8   | Significant Loss   |
|                        | Ethyl Amyl Ketone             | $C_8H_{16}O$           | 106-68-3   | Partially Retained |
|                        | Methyl Ethyl Ketone (Mek)     | $CH_3COC_2H_5$         | 78-93-3    | Significant Loss   |
|                        | Methyl Isobutyl Ketone (Mibk) | $C_6H_{12}O$           | 108-10-1   | Significant Loss   |
|                        | Methyl Isobutyl Ketone (Mibk) | $CH_3COCH_2CH(CH_3)_2$ | 108-10-1   | Partially Retained |
| Nitriles               | Acetonitrile                  | $CH_3CN$               | 75-05-8    | Partially Retained |
|                        | Acrylonitrile                 | $CH_2=CHCN$            | 107-13-1   | Fully Retained     |
|                        | Benzonitrile                  | $C_6H_5CN$             | 100-47-0   | Partially Retained |
|                        | Butyronitrile                 | $C_3H_7CN$             | 109-74-0   | Fully Retained     |
|                        | Hydrogen Cyanide              | $HCN$                  | 74-90-8    | Fully Retained     |
|                        | Propionitrile                 | $C_2H_5CN$             | 107-12-0   | Fully Retained     |
| Nitro Compounds        | 1-Nitropropane                | $C_3H_7NO_2$           | 108-03-2   | Fully Retained     |
|                        | 2-Nitropropane                | $(CH_3)_2CHNO_2$       | 79-46-9    | Fully Retained     |
|                        | Methyl Nitrate                | $CH_3NO_3$             | 598-58-3   | Partially Retained |
|                        | Nitrobenzene                  | $C_6H_5NO_2$           | 98-95-3    | Partially Retained |
|                        | Nitroethane                   | $C_2H_5NO_2$           | 79-24-3    | Fully Retained     |
|                        | Nitromethane                  | $CH_3NO_2$             | 75-52-5    | Fully Retained     |
| Oxides                 | Carbon Dioxide                | $CO_2$                 | 124-38-9   | Fully Retained     |
|                        | Carbon Monoxide               | CO                     | 630-08-0   | Fully Retained     |
|                        | Ethylene Oxide                | $C_2H_4O$              | 75-21-8    | Partially Retained |
|                        | Nitric Oxide                  | NO                     | 10102-43-9 | Fully Retained     |
|                        | Nitrogen Dioxide              | $NO_2$                 | 10102-44-0 | Fully Retained     |
|                        | Nitrous Oxide                 | $N_2O$                 | 10024-97-2 | Fully Retained     |
|                        | Ozone                         | $O_3$                  | 10028-15-6 | Fully Retained     |
|                        | Propylene Oxide               | $C_3H_6O$              | 75-56-9    | Partially Retained |



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| Peroxides         | Hydrogen Peroxide (Vapor) | $H_2O_2$       | 7722-84-1             | Significant Loss   |
|                   | Tert-Butyl Hydroperoxide  | $(CH_3)_3COOH$ | 75-91-2               | Significant Loss   |
| Sulfur-Containing | Carbon Disulfide          | $CS_2$         | 75-15-0               | Fully Retained     |
|                   | Dimethyl Sulfide          | $(CH_3)_2S$    | 75-18-3               | Fully Retained     |
|                   | Dms                       | $(CH_3)_2S$    | 75-18-3               | Fully Retained     |
|                   | Dmso                      | $(CH_3)_2SO$   | 67-68-5               | Significant Loss   |
|                   | Hydrogen Sulfide          | $H_2S$         | 7783-06-4             | Fully Retained     |
|                   | Methyl Mercaptan          | $CH_3SH$       | 74-93-1               | Partially Retained |
|                   | Methyl Sulfide            | $(CH_3)_2S$    | 75-18-3               | Fully Retained     |
|                   | Sulfur Hexafluoride       | $SF_6$         | 2551-62-4             | Fully Retained     |
|                   | Thiosinamine              | $C_4H_8N_2S$   | 109-57-9; 185147-29-9 | Significant Loss   |