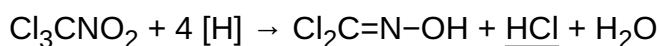


Phosgene oxime

Phosgene oxime, or **CX**, is an organic compound with the formula Cl₂C=N-OH. It is a potent chemical weapon, specifically a nettle agent. The compound itself is a colorless solid, but impure samples are often yellowish liquids. It has a strong, disagreeable and irritating odor. It is used as a reagent in organic chemistry.^[2]

Preparation and reactions

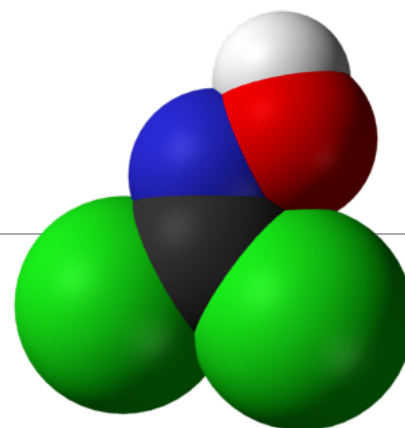
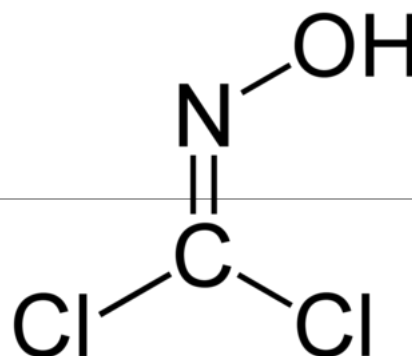
Phosgene oxime can be prepared by reduction of chloropicrin using a combination of tin metal and hydrochloric acid as the source of the active hydrogen reducing agent:



The observation of a transient violet color in the reaction suggests intermediate formation of trichloronitrosomethane (Cl₃CNO). Early preparations, using stannous chloride as the reductant, also started with chloropicrin.^[3]

The compound is electrophilic and thus sensitive to nucleophiles, including bases, which destroy it:

Phosgene oxime



- Carbon, C
- Hydrogen, H
- Oxygen, O
- Nitrogen, N
- Chlorine, Cl

Names

Preferred IUPAC name

1,1-Dichloro-*N*-hydroxymethanimine

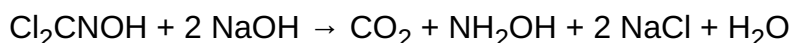
Other names

CX
Dichloroformaldehyde oxime
Dichloroformaldoxime
Dichloroformoxime
Hydroxycarbonimidic dichloride

Identifiers

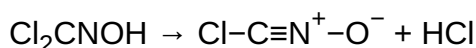
<u>CAS Number</u>	1794-86-1 (https://commonchemistry.cas.org/detail?cas_rn=1794-86-1) ✓
3D model (JSmol)	Interactive image (https://chemapps.stolaf.edu/jmol/jmol.php?model=Cl%2FC%28Cl%29%3DN%5CO)
<u>ChemSpider</u>	59024 (https://www.chemspider.com/Chemical-Structure.59024.html) ✓
<u>PubChem CID</u>	65582 (https://pubchem.ncbi.nlm.nih.gov/compound/65582)
<u>UNII</u>	G45S3149SQ (https://precision.fda.gov/uniisearch/srs/unii/G45S3149SQ) ✓
<u>CompTox Dashboard (EPA)</u>	DTXSID9075292 (https://comptox.epa.gov/dashboard/chemical/details/DTXSID9075292)
<u>InChI</u>	[show]
	InChI=1S/CHCl2NO/c2-1(3)4-5/h5H ✓ Key: JIRJHEXNDQBKRZ-UHFFFAOYSA-N ✓
	InChI=1/CHCl2NO/c2-1(3)4-5/h5H Key: JIRJHEXNDQBKRZ-UHFFFAOYAP
<u>SMILES</u>	[show]
	<chem>Cl/C(Cl)=NO</chem>
Properties	
<u>Chemical formula</u>	Cl ₂ CNOH
<u>Molar mass</u>	113.93 g·mol ⁻¹
<u>Appearance</u>	colorless or white solid
<u>Odor</u>	Strong, disagreeable and irritating
<u>Melting point</u>	35 to 40 °C (95 to 104 °F; 308 to

	313 K ^[1]
<u>Boiling point</u>	128 °C (262 °F; 401 K) ^[1]
<u>Solubility in water</u>	70% ^[1]
Hazards	
Occupational safety and health (OHS/OSH):	
Main hazards	Highly toxic
Related compounds	
Related compounds	<u>Formaldoxime</u> <u>Phosgene</u> <u>Oxime</u>
Except where otherwise noted, data are given for materials in their standard state (at 25 °C [77 °F], 100 kPa).	
✗ verify (what is ✓✗ ?)	
<u>Infobox references</u>	



Phosgene oxime has been used to prepare heterocycles that contain N-O bonds, such as isoxazoles.^[4]

Dehydrohalogenation upon contact with mercuric oxide generates chlorine fulminate, a reactive nitrile oxide.^[5]



Toxicity

Phosgene oxime is classified as a vesicant even though it does not produce blisters.^[6] It is toxic by inhalation, ingestion, or skin contact. The effects of the poisoning occur almost immediately. No antidote for phosgene oxime poisoning is known. Generally, any treatment is supportive. Typical physical symptoms of CX exposure are as follows:

- **Skin:** Blanching surrounded by an erythematous ring can be observed within 30 seconds of exposure. A wheal develops on exposed skin within 30 minutes. The original blanched area acquires a brown pigmentation by 24 hours. An eschar forms in the pigmented area by 1 week and sloughs after approximately 3 weeks. Initially, the effects of CX can easily be misidentified as mustard gas exposure. However, the onset of skin irritation resulting from CX exposure is a great deal faster than mustard gas, which typically takes several hours or more to cause skin irritation.
- **Eyes:** Eye examination typically demonstrates conjunctivitis, lacrimation, lid edema, and blepharospasm after even minute exposures. More severe exposures can result in keratitis, iritis, corneal perforation, and blindness.
- **Respiratory:** Irritation of the mucous membranes may be observed on examination of the

oropharynx and nose. Evidence of pulmonary edema, including rales and wheezes, may be noted on auscultation. Pulmonary thromboses are prominent features of severe CX exposure.

- Gastrointestinal: Some animal data suggest that CX may cause hemorrhagic inflammatory changes in the GI tract.

References

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2. Wang, Xinyan; Chen, Wenwen (2017). "Dichloroformaldehyde Oxime". *Encyclopedia of Reagents for Organic Synthesis*. pp. 1–2. doi:10.1002/047084289X.rn02011 (<https://doi.org/10.1002%2F047084289X.rn02011>). ISBN 9780470842898.
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4. Chen, Wenwen; Zhang, Jianlan; Wang, Bo; Zhao, Zhouxing; Wang, Xinyan; Hu, Yuefei (2015). "Tandem Synthesis of 3-Chloro-4-iodoisoxazoles from 1-Copper(I) Alkynes, Dichloroformaldoxime, and Molecular Iodine". *The Journal of Organic Chemistry*. **80** (4): 2413–2417. doi:10.1021/jo502634h (<https://doi.org/10.1021%2Fjo502634h>). PMID 25594794 (<https://pubmed.ncbi.nlm.nih.gov/25594794>).
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External links

- EMedicine: Urticants, Phosgene Oxime (<http://www.emedicine.com/emerg/topic903.htm>)
 - Center for the Study of Bioterrorism: Phosgene Oxime (https://web.archive.org/web/20131229033312/http://bioterrorism.slu.edu/bt/products/ahec_chem/scripts/PhosgeneOxime.pdf)
 - Centers for Disease Control: Facts About Phosgene Oxime (<https://web.archive.org/web/20060110155811/http://www.bt.cdc.gov/agent/phosgene-oxime/basics/facts.asp>)
 - Virtual Naval Hospital: Phosgene Oxime (https://web.archive.org/web/20051122235728/http://www.vnh.org/MedAspChemBioWar/chapters/chapter_7.htm#Phosgene%20Oxime)
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