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# Chlorofluorocarbons (CFCs or Freon compounds)



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## The Freon/CFC Experts

- Responsible Party Identification
- GIS and Geomatics
- Contaminant Hydrogeology
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- Remediation Feasibility Studies
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- Water Resources Assessment
- Source Water Assessment and Protection
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## Properties of Common Chlorofluorocarbons

Chlorofluorocarbon	Compound Name	Boiling Point	Density	Molecular Weight	Solubility <sup>3</sup>	Henry's Law Constant <sup>3</sup>	Octanol-Water Partition Coef. (log K <sub>ow</sub> ) <sup>3</sup>	Ref
		°C	g/cm <sup>3</sup> at 25°C	g/mol	mg/L at 25°C	Unitless	unitless	
CFC-11 Freon-11	Trichlorofluoromethane	23.8	1.49	137.37	1,100	4.03	2.13	1
CFC-12 Freon-12	Dichlorodifluoromethane	-29.8	1.31	120.91	280	16.67	1.82	1
CFC-113 Freon-113	1,1,2-Trichloro-1,2,2-trifluoroethane	47.7	1.56	187.38	200	22.03	3.09	2

## California Water Quality Criteria and Guidelines<sup>4</sup>

Chlorofluorocarbon	Regulatory Limit (µg/L)		
	Notification Level	Preliminary Health Goal	Maximum Contaminant Level
CFC-11	---	700	150
CFC-12	1,000	---	---
CFC-113	---	4,000	1,200

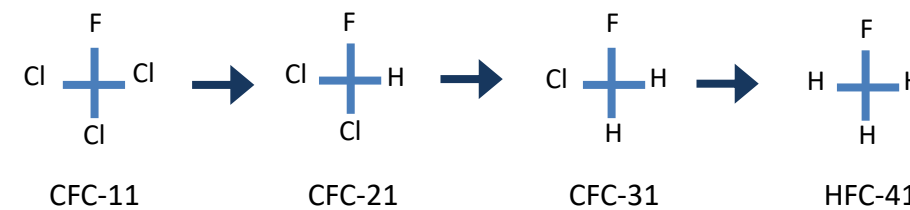
## Typical Uses of Chlorofluorocarbons

Chlorofluorocarbon	Synonym	Use
Freon-11	Trichlorofluoromethane	Aerosol spray cans
	CFCl <sub>3</sub>	Solvent
	Freon-11	Foam blowing agent
Freon-12	Dichlorodifluoromethane	Refrigerators
	CF <sub>2</sub> Cl <sub>2</sub>	Air conditioners
	Freon-12	Foam blowing agent
Freon-113	Trichlorotrifluoroethane	Cleaning solvent for manufacturing processes and electronic components
	C <sub>2</sub> F <sub>3</sub> Cl <sub>3</sub>	
	Freon-113	

## California Drinking Water Sources and Systems Impacted by Chlorofluorocarbons<sup>5</sup>

Compound	Number of Systems	Number of Sources	Maximum Detected Concentration (µg/L)
Freon-11	24	48	244
Freon-12	52	216	101
Freon-113	20	30	91

## Anaerobic Biotransformation Pathway of Freon-11



**Sources:**

1. U.S. EPA. (1992). Handbook of RCRA Groundwater Monitoring Constituents: Chemical and Physical Properties. 530-R-92-022.
2. U.S. EPA. (1994). Chemical Summary for Freon-113. August.
3. <http://www.gsi-net.com/en/publications/gsi-chemical-database.html>
4. CDPH. (2011). MCLs, DLRs, and PHGs for Regulated Drinking Water Contaminants. July 27.
5. California Department of Public Health as of November 2011.