

Chemistry for Clinical Providers

“Man dead after contaminated water used in dialysis

- Man died after accidentally receiving chemicals while undergoing dialysis
- ...routine flush was being done. ...wrong valve was opened and instead of peracetic and hydrogen peroxide being flushed out of the system it went into the line that was circulating through the dialysis equipment
- Mistake was noticed within minutes, ...water supply was immediately turned off
- National Research Council (US) Committee on Acute Exposure Guideline Levels.
- Washington (DC): [National Academies Press \(US\)](#); 2010.

Outcomes

- 4 patients stable after recovering
- 1 died
- “when we did the research, it said it causes sunburn....”

Peracetic Acid

<https://www.ncbi.nlm.nih.gov/books/NBK220001/table/ttt00165/?report=objectonly>

TABLE 7-2 Physical and Chemical Data for Peracetic Acid

Parameter	Data	Reference
Chemical Name	Peracetic acid	O'Neil et al. 2001
Synonyms	Peroxyacetic acid, acetic peroxide, ethaneperoxoic acid, acetyl hydroperoxide, Proxitane 4002, Proxitane 1507, Proxitane AHC	O'Neil et al. 2001; RTECS 2003
CAS Registry No.	79-21-0	RTECS 2003
Chemical Formula	CH ₃ COOOH	O'Neil et al. 2001
Molecular Weight	76.05	O'Neil et al. 2001
Physical State	Colorless liquid	Lewis 1993
Boiling/Freezing/Flash Point	105 °C/-30 °C/40.5 °C	Lewis 1993
Density	1.15 at 20 °C	Lewis 1993
Solubility	Freely soluble in H ₂ O, alcohol, ether, H ₂ SO ₄	O'Neil et al. 2001
Vapor Pressure	14.5 mm Hg at 25°C	HSDB 1997
Explosion point	110 °C	Lewis 1993
Henry's Law Constant	2.08×10^{-6} atmm ³ /mol at 25 °C	HSDB 1997
Conversion factors	1 ppm = 3.04 mg/m ³ at 20 °C and 101kPa 1mg/ m ³ = 0.33 ppm	IUCLID 2000

Effects of Peracetic Acid

<https://www.ncbi.nlm.nih.gov/books/NBK220001/table/ttt00166/?report=objectonly>

TABLE 7-3 Physiologic Response to Low Level Exposure to Peracetic Acid Aerosols Generated by a Fogger

Time	ppm (as total H ₂ O ₂) ^a	Observed Effects
3.30	5 (15.6)	Lacrimation, extreme discomfort, irritation of nasal membranes
3.37	5 (15.6)	Lacrimation, extreme discomfort, irritation of nasal membranes
3.53	1 to 1.5 (3.12-4.67)	Slight discomfort of nasal and eye membranes, decreasing with concentration
	0.5 to 1.0 (1.56-3.12)	
	<0.5 (1.56)	
4.05	2.0 (6.23)	Irritation considered unbearable
5.00	2.5 (7.79)	Extreme discomfort of nasal membranes
5.10	2.5 (7.79)	Extreme discomfort
	3.0 (9.35)	Extreme discomfort
5.15	3.0 (9.35)	Extreme discomfort
5.20	2.0 (6.23)	Irritation tolerable for 2 min

Peracetic Acid

- Corrosive/irritating to the eyes, mucous membranes of the respiratory tract, and skin
 - It causes lacrimation, extreme discomfort, and irritation to the upper respiratory tract in human beings after exposure to concentrations as low as 15.6 mg peracetic acid/m³ (5ppm) for only 3 minutes
 - Exposure to lethal concentrations of peracetic acid causes hemorrhage, edema, consolidation of the lungs
- National Research Council (US) Committee on Acute Exposure Guideline Levels.
 - Washington (DC): [National Academies Press \(US\)](#); 2010.