

*DESTRUCTION OF FORMER CHEMICAL WEAPONS
PRODUCTION FACILITIES:
BUILDINGS DECONTAMINATION ISSUES*

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Russia

Carcasses of Former Chemical Weapons Production Facilities at JSC "Kaprolaktam - Dzerzhinsk"



Toxicometric Parameters of Lewisite

Parameter of Toxicity	Route of the Substance Exposure	Animal Species	Value of the Parameter
LD₅₀	Intragastric	Dogs	20.0 mg/kg
LD₅₀	Intragastric	Cats	10.0 mg/kg
LD₅₀	Intragastric	Rabbits	15.0 mg/kg
LD₅₀	Intragastric	Rats	3.43 mg/kg
Lim_{ac}	Intragastric	Rats	1.75•10⁻² mg/kg
Cumulation Coefficient	Intragastric	Rats	>1000
Safe Reference Level of Impact for atmospheric air			4.0•10⁻⁶ mg/m³
Maximum Permissible Concentration for water of water bodies			2.0•10⁻⁴ mg/l
Maximum Permissible Concentration for soil			0.1 mg/kg
Class of Hazard			1

Toxicometric Parameters of Arsenic (III)

Parameter of Toxicity	Route of the Substance Exposure	Animal Species	Value of the Parameter
LD₅₀	Intragastric	Rats	48 mg/kg
Lim_{ac}	Intragastric	Rats	0.7 mg/kg
Cumulation Coefficient	Intragastric	Rats	6.9
Maximum Permissible Average Daily Concentration for atmospheric air			0.0003 mg/m³
Maximum Permissible Concentration for water of water bodies			0.01 mg/l
Maximum Permissible Concentration for soil			2.0 mg/kg
Class of Hazard			1

Classification of Waste (Russia)

- 1 class – extremely hazardous;
- 2 class – highly hazardous;
- 3 class – moderately hazardous;
- 4 class – low hazardous.

Construction Materials Selected for Researches

- Concrete from the floor.
- Lining tiles from equipment.
- Bricks and plaster from the walls.
- Wooden fragments of window crosses.
- Brick from dismantled buildings.

Concentration of Lewisite and Arsenic in the Fragments of Construction Materials (Building # 317)

Fragments of Structural Units and Equipment	Components of the Waste							
	Lewisite				Arsenic			
	Total Number of Samples	Concentration, mg/kg			Total Number of Samples	Concentration, mg/kg		
		Average	Minimum	Maximum		Average	Minimum	Maximum
Concrete from the floor	14	31,8	0,03	213,7	14	2048,0	60,1	7405,9
Bricks, plaster from the walls	14	165,5	1,0	1145,0	14	2544,1	32,4	11667,8
Lining plates from equipment	4	1310,8	122,3	3748,0	4	6302,8	3073,4	8872,0
Wooden fragments of window crosses	3	124,0	16,5	211,4	3	92,7	132,9	157,9

Calculated Classes of Hazard of Construction Materials Decontaminated by Cementation

Construction Materials	Class of Hazard
Lining tiles from equipment	2
Concrete from the floor	2
Brick and plaster from walls	3-4
Wooden fragments of window crosses	4

Toxicological Assessment of Hazard of Cemented Construction Materials Includes:

- Characterization of general sanitary hazard of construction waste.
- Examination of waste effect on viability of hydrobionts.
- Analysis of phytotoxicity of waste test samples.
- Assessment of waste toxic components capability for migration into underground waters and atmospheric air.
- Determination of parameters of waste extracts acute lethal toxicity on animal models under peroral exposure.
- Assessment of subacute toxicity of waste extracts under peroral exposure of laboratory animals.

Experimentally Determined Classes of Hazard of Construction Materials

Construction Materials	Class of Hazard
Lining tiles from equipment	4
Concrete from the floor	4
Brick and plaster from walls	4
Wooden fragments of window crosses	4

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