Toxic Chemical Transport Risk: Tables for School Safety Planning

1. Common Toxic Chemicals Transported to Water Treatment Plants

Chemical	Use in Water Treatment	Typical Form
Chlorine gas (Cl2)	Disinfection	Compressed gas (rail tank)
Sulfur dioxide (SO2)	Dechlorination & disinfection	Liquefied gas
Ammonia (NH3)	Chloramine production	Anhydrous or aqueous
Hydrochloric acid (HCl)	pH adjustment	Liquid
Sodium hydroxide (NaOH)	pH control and neutralization	Liquid (caustic soda)

2. Chemical Reactions and Risks if Exposed to Air or Moisture

Chemical	Reaction with Air/Moisture	Hazard to Children
Chlorine	Forms acids in lungs; green/yellow toxic	Lung damage, eye burns, potentially fatal within minutes
Sulfur dioxide	Forms sulfurous acid; pungent gas	Severe respiratory distress
Ammonia	Expands as gas; forms ammonium hydroxide	Burns mucous membranes, eye/skin/respiratory damage
Hydrochloric acid	Vapor corrosive; burns tissue	Eye/lung irritation, chemical burns
Sodium hydroxide	Caustic; thermal and chemical burns	Severe tissue damage

3. Emergency Protocol: Shelter-in-Place vs. Evacuate

Chemical	Recommended Action	Rationale
Chlorine gas	Shelter-in-Place, then evacuate	Heavier than air; sheltering reduces exposure
Sulfur dioxide	Shelter-in-Place	Quick exposure is fatal; time needed to mobilize
Ammonia	Evacuate immediately	Lighter than air, rises quickly
Hydrochloric acid	Shelter-in-Place	Slow gas dispersion
Sodium hydroxide	Shelter-in-Place	Main concern is contact, not vapor

4. Preparedness Recommendations for Schools

Preparedness Measure	**Purpose**
Automated HVAC shutoff	Prevents toxic air circulation
Shelter-in-place zone	Safe interior location with minimal exposure
Coordination with first responders	Ensures rapid response and evacuation plan
Chemical route awareness	Improves advance warning and situational planning
Emergency supply stockpile	Short-term safety: duct tape, plastic, N95 masks