Hydrofluoric Acid (HF)

- Physical Properties
  - Colorless gas or fuming liquid
  - Pungent odor at <1 ppm
  - pK_a = 3.15
  - Exothermic with water
- Toxicity
  - HF causes severe burns
    - Concentrated (> 50% HF) solutions cause immediate, severe, burning pain and a whitish discoloration of the skin which usually proceeds to blister formation
    - Moderately concentrated (20-50% HF) solutions may have up to an 8 hour latency period for symptoms
    - Dilute (<20%) solutions may not produce symptoms for up to 24 hours
    - Concentrated HF burns can be fatal if only 2% of the body surface area is exposed
  - Fluoride ions readily penetrate the skin, causing destruction of deep layer tissues that can continue for days if left untreated
  - Fluoride ions form insoluble salts with calcium and magnesium in tissue, which is thought to be the cause for the severe, throbbing pain associated with HF burns
  - Fluoride poisoning is associated with hypocalcemia (low calcium levels), hyperkalemia (high potassium levels), hypomagnesemia (low magnesium levels), and sudden death
- Handling
  - Follow all standard procedures for dangerous chemicals, including reviewing safety and proper handling, notifying safety officers, wearing PPE, and never working alone
    - It is especially important to use the most appropriate gloves based on the concentration of HF and the length of time for handling
  - Use containers made from polyethylene or Teflon, NEVER glass
  - Have either 2.5% calcium gluconate gel or Zephiran solution on hand
- First Aid
  - Immediately flush the area with cold, running water for 5 minutes, and remove any contaminated clothing
  - Dial 77, and disclose that the injury is a xx% or xx M hydrofluoric acid burn while the person is washing the burn site
  - Use a new pair of resistant gloves and massage the 2.5% calcium gluconate gel into the burn site (CaF_2 should precipitate)
  - Re-apply the 2.5% calcium gluconate gel every 10-15 minutes or until EMS arrives
- Misc.
  - Do not attempt to neutralize HF with sodium or potassium carbonate, sodium or potassium hydroxide, or silicon-based absorbent materials