

Operator Quiz Corner  
**Chemical Safety**  
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Water operators handle chemicals in a wide range of daily tasks: sample preservation, disinfecting/dechlorinating water mains, coagulation, corrosion control treatment and disinfection. Some important things to keep in mind regardless of the type or quantity of chemical being used:

- Be familiar with the Safety Data Sheet (SDS) which will provide valuable information on the chemical's characteristics, level of hazard, required personal protective equipment (PPE), and first aid procedures.
- Use appropriate PPE
- Never store strong acids or bases together
- When diluting chemicals always add the water first and then the chemical

Below are a few common water utility chemicals and important considerations when using them:

### **Chlorine gas**

It is a greenish-yellow gas that is 2 ½ times heavier than air. It can be deadly if the surrounding air is comprised of more than 0.1 % of chlorine gas. Small chlorine leaks can be found by spraying a small amount of ammonia which will form a white cloud. Self-Contained Breathing Apparatus (SCBA) must be used whenever working with chlorine gas.

### **Liquid chlorine (sodium hypochlorite) and granular chlorine (calcium hypochlorite)**

Both hypochlorite compounds are commonly used disinfectants. Liquid chlorine, also known as bleach, is sold in concentrations ranging from 5% chlorine (household bleach) to 15% chlorine (commercial grade). Granular chlorine, sometimes called high test hypochlorite (HTH), is commonly sold in tablet or powder form with the available chlorine strength ranging from 50% to 65%. When either of these compounds comes in contact with organic materials it will quickly generate heat and release oxygen and chlorine. The greatest danger from either liquid or solid hypochlorite is contact with the eyes or skin and should be flushed thoroughly for at least 15 minutes. Wearing appropriate PPE will greatly minimize the risk of contact.

### **Sodium/potassium hydroxide**

Both sodium hydroxide (a.k.a. caustic soda) and potassium hydroxide are commonly used to raise the pH of water for corrosion control purposes. It is purchased in strengths ranging from 25% to 50% strength. Both are strong alkalis and very reactive. They can react violently with a number of substances and can cause serious skin burns. Solutions of sodium hydroxide feel thick and slippery. Any large spills are best handled by trained personnel which will involve dilution with water and neutralization with dilute acetic acid. As with strong acids and bases it is critical that operators not become complacent when wearing proper PPE.

Click here to view the American Water Works Association video on water treatment chemical safety:  
<https://www.youtube.com/watch?v=Y1CzuaEwd50>

- 1) A face shield, apron and gloves are \_\_\_\_\_ items.
  - a) OSHA
  - b) PPE

- c) SDS
  - d) SCBA
- 2) If an operator is in a chlorine gas room without SCBA equipment and suspects that there is a chlorine gas leak, what is the first thing the operator should do.
- a) Keep head as high as possible and leave the area immediately
  - b) Call 911
  - c) Spray an ammonia solution around the area of the suspected leak and repair immediately
  - d) Put on the SCBA breathing apparatus immediately
- 3) Which of the following is a very strong basic solution that can cause serious burns?
- a)  $\text{Cl}_2$
  - b)  $\text{NaClO}$
  - c)  $\text{Ca}(\text{ClO})_2$
  - d)  $\text{NaOH}$
- 4) True or false? All chemical spills can be cleaned with a dilution of water and neutralization with acetic acid.
- a) True
  - b) False
- 5) MassDEP Guidelines and Policies (Chapter 6, Section 6.1.11) requires that the storage area for liquid chemicals provide at least 110 % secondary containment. What is the minimum size ( $\text{ft}^3$ ) of the secondary containment area needed for a 500-gallon tank of 12% sodium hypochlorite?
- a) 4.5
  - b) 66.8
  - c) 73.5
  - d) 550

*Solution:*

$$500\text{-gal} \times (1\text{ft}^3/7.48\text{ gal}) \times 1.10 = 73.5\text{ ft}^3$$

