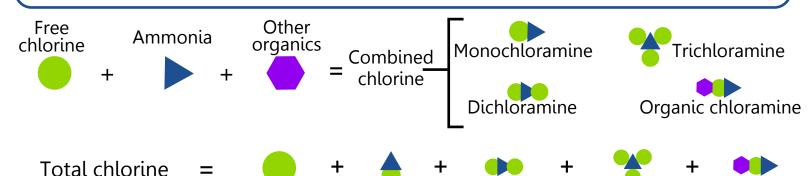
## Free vs Total Chlorine

# Total Chlorine = Free Chlorine + Combined Chlorine

- •Free chlorine: the sum of molecular chlorine (Cl<sub>2</sub>), hypochlorous acid (HOCl), and hypochlorite ion (OCl-) in a solution
- •Combined chlorine: formed when an amine-containing molecule (e.g. ammonia) is added to free chlorine (see reaction below)
- •Total chlorine: the sum of free and combined chlorine in a solution



Total chlorine = Free chlorine + Combined chlorine

#### **FREE CHLORINE**

- Less stable, difficult storage
- •More effective biocide
- •Effective at pH < 8.5
  - Sodium hypochlorite, calcium hypochlorite, chlorine gas

#### **TOTAL CHLORINE**

- More stable and persistent
- Disinfect via oxidation reactions
- •Available in solid and liquid form
- •Less disinfection byproducts
  - •Effective at pH < 10
- Monochloramine, dichlorodimethylhydantoin, chloroisocyanuric acid





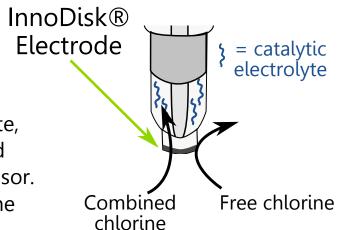
Zirkon® DIS Total Sensor Total chlorine

### Choosing the Correct Measurement

- •For applications that contain **no ammonia** (e.g. municipal drinking water), use a free chlorine measurement.
- •For applications where ammonia or chloramines may be present (e.g. municipal wastewater), use a total chlorine measurement.

#### KUNTZE TECH HIGHLIGHT: Zirkon® DIS Total Sensor

- •Kuntze's Zirkon® DIS Total sensor (shown above) measures total chlorine.
- •The tip of the sensor features Kuntze's patented InnoDisk® electrode (right), which measures the reduction of HOCl and OCl-.
- •The sensor is filled with a catalytic electrolyte, which reacts with chloramines and combined chlorine so they can be measured by the sensor.
- •The resulting measurement is a total chlorine measurement.



## Kuntze Academy – CHEM102

•Want more help on this topic? Scan this QR code to learn more.



CHEM102: Introduction to Total Chlorine

### **Kuntze Support Center**

•More questions? Check out the Kuntze Support Center.



**Kuntze Support** Center

