

BASIC INFORMATION ABOUT DRINKING WATER DISINFECTION

4) What **disinfectants** are available for drinking water?

Most water utilities use chlorine as a *primary disinfectant* because of its effectiveness in killing potentially harmful organisms.²

- Chlorine is effective in killing bacteria, viruses, and other potentially harmful organisms in water.
- One disadvantage of chlorine is it can react with natural organic matter³ present in water to form potentially harmful disinfection byproducts.
- Water utilities sometimes use chlorine several times during treatment because the initial dose loses its effectiveness over time.

Monochloramine is commonly used as a *secondary disinfectant* to protect the water as it travels from the treatment plant to consumers.

- Monochloramine is effective in killing bacteria, viruses, and other potentially harmful organisms but takes much longer to act than chlorine.
- One disadvantage of monochloramine is it can react with natural organic matter present in water to form potentially harmful disinfection byproducts.
- Monochloramine is more chemically stable than chlorine, which makes it longer lasting and an effective secondary disinfectant.

Water utilities may use *ozone, UV light, or chlorine dioxide* as primary disinfectants in the treatment plant.

- **Ozone**, UV light, and chlorine dioxide are effective in killing bacteria, viruses, and other potentially harmful organisms in water at the treatment plant.
- One disadvantage of ozone, UV light, and chlorine dioxide is they do not provide protection as water travels through pipes.
- Either chlorine or monochloramine should still be used in addition to any primary treatment process to protect the quality of treated water as it travels from the treatment plant to the customer.

Additional Supporting Information:

1. See question 3 for a discussion of primary and secondary disinfectants. See questions 5 and 6 for a specific discussion of chlorine and monochloramine as a primary and secondary disinfectant.
2. Potentially harmful organisms include disease-causing bacteria, viruses, and protozoa. Chlorination and chloramination are not effective at inactivating *Cryptosporidium*. EPA requires that utilities that use surface water test and treat for *Cryptosporidium* where necessary.
3. **Natural Organic Matter:** Complex organic compounds that are formed from decomposing plant, animal and microbial material in soil and water. They can react with disinfectants to form disinfection by products. Total organic carbon (TOC) is often measured as an indicator of natural organic matter.