

DISINFECTION

History of disinfection

- J _____ S _____ and the Broad Street pump in 1854
- he was able to show that 59 of the 77 c _____ victims used the pump on Broad Street
- There was a w _____ in the vicinity where cholera was endemic but nobody at this workhouse got cholera. This particular workhouse had its own w _____. The cause of contamination turned out to be the d _____ of an infected person that was within three feet of the well.

Disinfection of water supplies by

c _____ began in Chicago and New Jersey in 1908, within 2 years chlorination of w _____ s _____ was practiced in N.Y., Montreal, Milwaukee, Cleveland, Nashville, Baltimore, and Cincinnati. By 1918, over 1000 _____ treating more than _____ bgd were chlorinating their water supplies.



Theory of Disinfection:

Chick's Law:
$$\frac{dN}{dt} = -kN$$

rate, k, is a function of c _____ and t _____ (i.e., CT) and type of organism

Typical disinfectants:

Chlorine:



Chloramines



Ozonation

- strong o _____, but no residual
- no THM f _____, but other (non-chlorinated) DBPs possible
- often used as a p _____ disinfectant

Chlorine Dioxide

- strong oxidant, but not as powerful as O _____
- dose limited to 1.0 mg/L due to health concerns of chlorite and c _____
- residual is not long l _____

UltraViolet Light

- uses thin layer of water and mercury vapor arc l _____ emitting UV in the range of 0.2 to 0.29 micron
- depth of light p _____ limited to 50 - 80 mm
- powerful, but no residual

ADSORPTION PROCESSES

- takes advantage of physical/chemical bond of pollutant with adsorbent (typically g _____ activated carbon or p _____ activated carbon)
- one ounce of GAC has a surface area of _____ acres
- good process for removal of THMs, DBPs, SOCs, VOCs
- PAC dose is typically _____ mg/L can be as high as _____ mg/L
- GAC can be used instead of a _____ in dual media filters, called filter adsorbers – must replace GAC every _____ years
- separate stage adsorption unit (c _____ unit) – GAC must be replaced every _____ to _____ months

