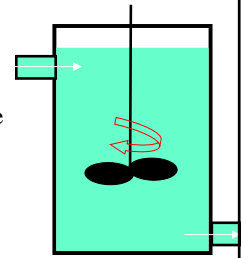


Coagulation: Purpose

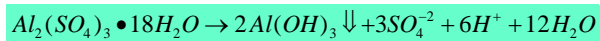
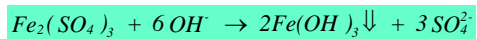
- ◆ Removal of turbidity
historically the reason for coagulation
- ◆ Removal of natural organic matter
more recently of importance
- ◆ Some removal of pathogens
giardia, cryptosporidium

Coagulant Addition: Rapid Mix

- ◆ Mixer
vertical shaft turbine impeller
- ◆ Tank
3 to 10 ft diameter
flow through, top to bottom
30 to 60 second detention time



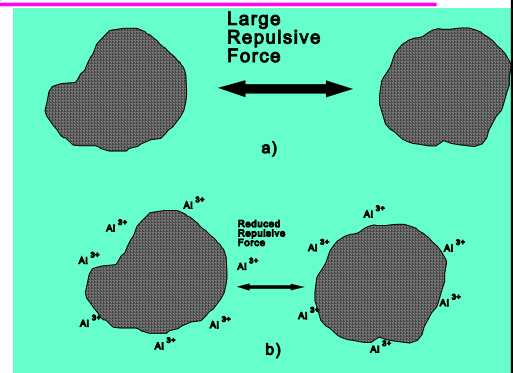
Coagulant chemistry



Mechanisms

- Charge Neutralization
- Sweep Floc (enmeshment)

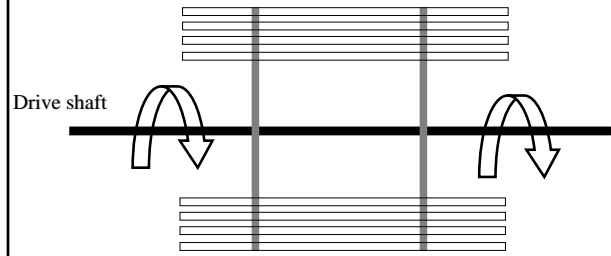
Charge neutralization



Flocculation: Purpose

- ◆ Promote agglomeration of particles into larger floc
- ◆ Units often designed on the basis of mixing intensity as described by the velocity gradient, G
 - some mixing is needed to keep particles in contact with other particles
 - too much mixing can cause floc break-up

Flocculators



Usually 4 arms with 3-4 slats per arm

Flocculation: cont.

$$G = \left(\frac{P/V}{\mu} \right)^{0.5}$$

Extent of Mixing = Gt

Flocculation: Design

- ◆ Flow through velocity: 0.5 to 1.5 ft/min
- ◆ variable speed paddle flocculators
 - peripheral velocities of 0.5-2.0 ft/sec
 - horizontal shaft: slower, best for conventional
 - vertical shaft: faster, best for direct filtration
- ◆ typical dimensions
 - 12 ft deep
 - length/width = 4
 - 30 min detention time