

## Sedimentation Example 3

### Group Problem

- If the settling velocity of the floc particles is  $0.055 \text{ cm/s}$ , determine the area of the sedimentation tank.
- Assume a factor of safety of 1.3
- Assume the system flowrate can vary from  $750 \text{ ml/min}$  to  $1,250 \text{ ml/min}$
- How does your estimate compare to what you have seen in the lab?

## Sedimentation Example 3

Knowing the overflow rate and the **minimum** flowrate, the area required is:

$$A = \frac{Q}{OFR} (SF) = (1.3) \frac{750 \text{ ml/min}}{0.055 \text{ cm/s}} \frac{1 \text{ cm}^3/\text{ml}}{60 \text{ s/min}} = 295.5 \text{ cm}^2$$

$$A = 295.5 \text{ cm}^2 \left( \frac{1 \text{ in.}}{2.54 \text{ cm}} \right)^2 = 45.8 \text{ in.}^2$$

In lab, each tank is 6 in. by 6 in. or  $36 \text{ in.}^2$ .

Therefore, for this estimate of particle velocity we need 1.27 tanks or **2 sedimentation tanks**

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Knowing the overflow rate and the **minimum** flowrate, the area required is:

$$A = \frac{Q}{OFR} (SF) = (1.3) \frac{1,250 \text{ ml/min}}{0.055 \text{ cm/s}} \frac{1 \text{ cm}^3/\text{ml}}{60 \text{ s/min}} = 492.4 \text{ cm}^2$$

$$A = 492.4 \text{ cm}^2 \left( \frac{1 \text{ in.}}{2.54 \text{ cm}} \right)^2 = 76.3 \text{ in.}^2$$

In lab, each tank is 6 in. by 6 in. or  $36 \text{ in.}^2$ .

Therefore, for this estimate of particle velocity we need 2.1 tanks or **3 sedimentation tanks**

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### Group Questions

- What if the settling velocity of the floc particles is greater than the computed  $0.055 \text{ cm/s}$ ?
- What if the settling velocity of the floc particles is less than the computed  $0.055 \text{ cm/s}$ ?
- How do these estimates compare to what you have seen in the lab?