

Water Treatment Math

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Filtration Rate

A filter with a media of 25 ft. by 25 ft. processes 5,500,000 gallons per day. What is the filtration rate?

- 1. Convert day to minutes: 24 hours x 60 minutes/hr. = 1,440 minutes**
- 2.
$$\frac{5,500,000 \text{ gallons/day}}{1 \text{ filter} \times \frac{25 \text{ ft.} \times 25 \text{ ft.}}{\text{filter}} \times 1,440 \text{ minutes/day}}$$**
- 3. = 6.11 gpm/sq. ft.**

Filter Production

A direct filter plant operates 5 dual media filters measuring 35 ft. by 45 ft. for a day period. The filters operate at a design filtration rate of 5.0 gpm/sq. ft. ? Calculate the daily production in MGD?

- 1. 5 filters x 35 ft. x 45ft. x 5 gpm x 1440 min**
filters sq. ft. day
- 2. = 56,700,000 gallons/day**
- 3. 56,700,000 gal/day**
1,000,000/million
- 4. = 56.7 MGD**

Area of Filters in Service

A filter plant operates at a design capacity of 80 MGD.

The plant operates with 20 filters in service at a filtration rate of 4.5 gpm/sq. ft. Calculate the area of each filter in service during this time period?

- 1. $\frac{80 \text{ MGD} \times 1,000,000/\text{million}}{20 \text{ filters} \times \frac{4.5 \text{ gpm}}{\text{sq. ft.}} \times \frac{1440 \text{ min}}{\text{day}}}$**
- 2. = 617 sq. ft. per filter**

Number of Filters in Service

How many filters measuring 25 ft. by 25 ft. will be required to process 15,000,000 gallons per day at a filtration rate of 4.0 gpm/.sq. ft.?

1. Convert day to minutes:

24 hours x 60 min/hr? 1440 minutes

2. $\frac{15,000,000 \text{ gallons/day}}{25 \text{ ft.} \times 25 \text{ ft.} \times 4.0 \text{ gpm/sq. ft.} \times 1440 \text{ min/day}}$
filters

3. = 4.2 filters

Disinfection

A water system applied 12.5 % sodium hypochlorite to a flow rate of 5 MGD at a dose of 2.0 mg/l. How many milliliters per minute of hypo. solution will be used? (The hypo. Solution weighs 10.2 lbs./gal.)

- 1. 5 MGD x 8.34 lbs./gal. x 2 mg/l
0.125 x 10.2 lbs./gal.**
- 2. = 65.41 gallons/day**
- 3. 65.41 gallons/day x 3,785 ml/gal
1,440 min/day**
- 4. = 172 ml/min**

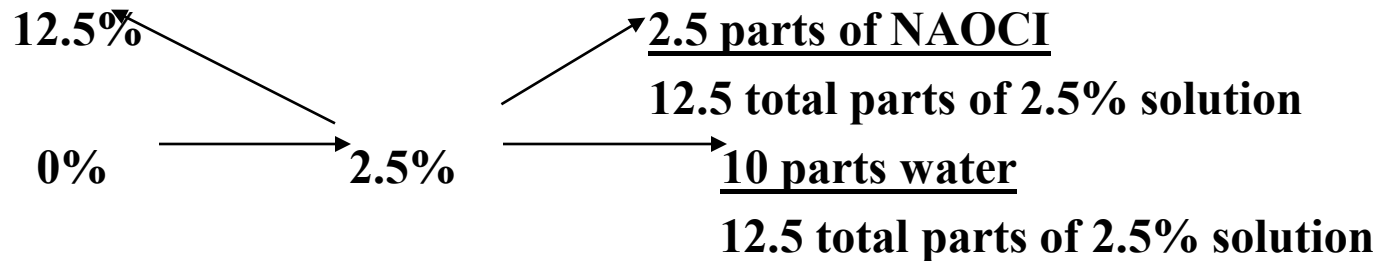
How many gallons of 12.5 sodium hypochlorite are required to disinfect 5 MGD? The chlorine concentration is 2.5 mg/L and the specific gravity is 1.2.

- 1. $\frac{5 \text{ MGD} \times 8.34 \text{ lbs./gal.} \times 2.5 \text{ mg/L}}{0.125 \times 8.34 \text{ lbs./gal.} \times 1.2}$**
- 2. = 83.3 gal/day**

Blending

How many gallons of water and 12.5% sodium hypochlorite must be mixed together to produce 55 gallons of 12.5 hypochlorite solution?

1. Find parts of NaOCl and water?



2. Find Gallons of NaOCl and water?
2.5 parts water / by 12.5 total parts: $0.2 \times 55 \text{ gallons} = 11 \text{ gallons NaOCl}$
3. 10 parts water / by 12.5 total parts: $0.8 \times 55 \text{ gallons} = 44 \text{ gallons of water}$

THE END