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Design of a Chlorination System for Wastewater Disinfection Formulas

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List of 11 Design of a Chlorination System for Wastewater Disinfection Formulas

Design of a Chlorination System for Wastewater Disinfection

1) Average Daily Consumption of Chlorine

Open Calculator

fx $$Cl_2 = D \cdot Q_a \cdot 8.34$$

ex $$8.333461\text{kg/d} = 0.004626\text{mg/L} \cdot 2.5\text{m}^3\text{/s} \cdot 8.34$$

2) Average Flow given Average Daily Consumption of Chlorine

Open Calculator

fx $$Q_a = \left(\frac{Cl_2}{D \cdot 8.34} \right)$$

ex $$2.999954\text{m}^3\text{/s} = \left(\frac{10\text{kg/d}}{0.004626\text{mg/L} \cdot 8.34} \right)$$

3) Average Flow given Capacity of Chlorinator at Peak Flow

Open Calculator

fx $$Q_a = \left(\frac{Cl_2}{D \cdot f \cdot 8.34} \right)$$

ex $$3.000254\text{m}^3\text{/s} = \left(\frac{10\text{kg/d}}{0.004626\text{mg/L} \cdot 0.9999 \cdot 8.34} \right)$$

4) Capacity of Chlorinator at Peak Flow

Open Calculator

$$Cl_2 = D \cdot Q_a \cdot 8.34 \cdot f$$

$$8.332628\text{kg/d} = 0.004626\text{mg/L} \cdot 2.5\text{m}^3\text{/s} \cdot 8.34 \cdot 0.9999$$

5) Dosage Used given Average Daily Consumption of Chlorine

Open Calculator

$$D = \left(\frac{Cl_2}{8.34 \cdot Q_a} \right)$$

$$0.005551\text{mg/L} = \left(\frac{10\text{kg/d}}{8.34 \cdot 2.5\text{m}^3\text{/s}} \right)$$

6) Dosage Used given Capacity of Chlorinator at Peak Flow

Open Calculator

$$D = \left(\frac{Cl_2}{f \cdot Q_a \cdot 8.34} \right)$$

$$0.005552\text{mg/L} = \left(\frac{10\text{kg/d}}{0.9999 \cdot 2.5\text{m}^3\text{/s} \cdot 8.34} \right)$$

7) Number of Coliform Organisms at any Initial Time

Open Calculator

$$N_0 = \left(\frac{N_t}{(1 + 0.23 \cdot C_t \cdot t)^{-3}} \right)$$

$$3.999999 = \left(\frac{3}{(1 + 0.23 \cdot 0.364646\text{mg/L} \cdot 20\text{min})^{-3}} \right)$$

8) Number of Coliform Organisms at Any Particular Time

Open Calculator

$$N_t = N_0 \cdot (1 + 0.23 \cdot C_t \cdot t)^{-3}$$

$$3.000001 = 4 \cdot (1 + 0.23 \cdot 0.364646\text{mg/L} \cdot 20\text{min})^{-3}$$

9) Peaking Factor given Capacity of Chlorinator at Peak Flow

Open Calculator

$$f = \left(\frac{Cl_2}{Q_a \cdot 8.34 \cdot D} \right)$$

$$1.199982 = \left(\frac{10\text{kg/d}}{2.5\text{m}^3\text{/s} \cdot 8.34 \cdot 0.004626\text{mg/L}} \right)$$

10) Residence Time given Number of Coliform Organisms at Any Particular Time

Open Calculator

$$t = \frac{\left(\frac{N_0}{N_t} \right)^{\frac{1}{3}} - 1}{0.23 \cdot C_t}$$

$$20.00002\text{min} = \frac{\left(\frac{4}{3} \right)^{\frac{1}{3}} - 1}{0.23 \cdot 0.364646\text{mg/L}}$$

11) Total Chlorine Residual at Any Particular Time

Open Calculator

fx $$C_t = \frac{\left(\frac{N_0}{N_t}\right)^{\frac{1}{3}} - 1}{0.23 \cdot t}$$

ex $$0.364646\text{mg/L} = \frac{\left(\frac{4}{3}\right)^{\frac{1}{3}} - 1}{0.23 \cdot 20\text{min}}$$

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Variables Used

- C_t Chlorine Residual *(Milligram per Liter)*
- Cl_2 Chlorine Required *(Kilogram per Day)*
- **D** Dosage *(Milligram per Liter)*
- **f** Peaking Factor
- N_0 Number of Coliform
- N_t Number of Coliform at Initial Time
- Q_a Average Flow *(Cubic Meter per Second)*
- **t** Residence Time *(Minute)*

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Constants, Functions, Measurements used

- Measurement: **Time** in Minute (min)
  Time Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m^3/s)
  Volumetric Flow Rate Unit Conversion
- Measurement: **Mass Flow Rate** in Kilogram per Day (kg/d)
  Mass Flow Rate Unit Conversion
- Measurement: **Density** in Milligram per Liter (mg/L)
  Density Unit Conversion

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Check other formula lists

- **Design of a Chlorination System for Wastewater Disinfection Formulas**
- **Population Forecast Method Formulas**

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