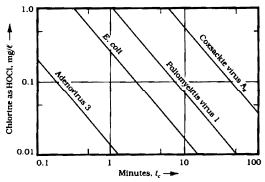
# Prechlorination

- Prechlorination may prevent odors and taste compounds from being produced by bacterial action in the settling basin sludge.
- Also, prechlorination may prevent algal growths on the filter media, which can cause tastes and odors.

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# Prechlorination Model

The rate of disinfection by a chemical can be modeled by:

$$-\frac{dN}{dt} = kN$$

where:

***dN/dt*** is the rate of cell destruction (number/time),
***k*** is the rate constant, and
***N*** is the number of living cells remaining at time ***t***.

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# Prechlorination Model

The rate of disinfection by a chemical can be modeled by:

$$\ln\left(\frac{N}{N_0}\right) = -kt$$

where $N_0$ is the number of living cells at $t = 0$

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# Disinfection Problem

The following is actual data for a virus exposed to an experimental disinfectant. Estimate the contact time required to obtain a reduction of the 1/10,000 of the original number of virus.

| Time,second | 4 | 8 | 12 |
|---|---|---|---|
| $N/N_0$ | 1/13 | 1/158 | 1/2000 |

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# Disinfection Problem

Plot the data with $-ln(N/N_0)$ on the y axis and time on the ***x*** axis. The data for the plot are as follows:

| Time,second | 4 | 8 | 12 |
|---|---|---|---|
| $N/N_0$ | 1/13 | 1/158 | 1/2000 |
| $-ln(N/N_0)$ | 2.56 | 5.06 | 7.60 |

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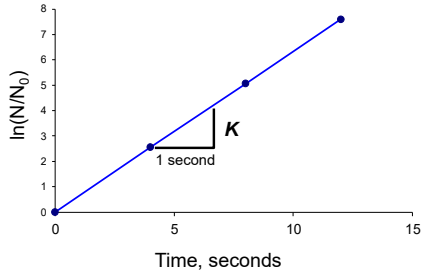
# Disinfection Problem

The data are plotted below:

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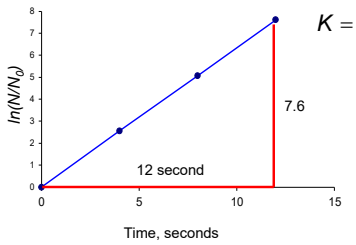
## Disinfection Problem

The slope of the line is the disinfection constant:




$$K = \frac{7.6}{12\,\text{sec}} = 0.63\,/\,\text{sec}$$

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## Disinfection Problem

The time required for a reduction of 1/10,000 is:

$$t = \frac{-\ln\left(\frac{N}{N_0}\right)}{k} = \frac{-\ln\left(\frac{1}{10{,}000}\right)}{0.634\,/\,\text{sec}} = 14.52 \text{ seconds}$$

$t$ = 14.52 seconds or 15 seconds

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## Treatment Processes

Any Questions?

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