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1) BOD₅/COD

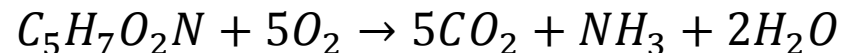
Assume UBOD=COD as the compound can be completely mineralized biologically

$$\frac{BOD_5}{COD} = \frac{BOD_5}{UBOD} = 1 - \exp(-k_1 t) = 1 - \exp(-0.23/d \times 5d)$$

$$\frac{BOD_5}{COD} = 0.68$$

2) COD/TOC

The reaction to completely mineralize the organic compound can be written as



Molecular weight: 113

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COD per g compound is calculated as:

$$\frac{5 \times 32 \text{ g } O_2}{113 \text{ g } C_5H_7O_2N} = 1.42 \text{ g COD/g } C_5H_7O_2N$$

This value will be utilized later in this class for modeling biological wastewater treatment!

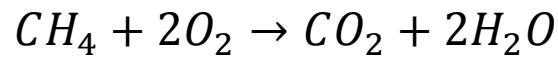
TOC per g compound is calculated as:

$$\frac{5 \times 12 \text{ g } C}{113 \text{ g } C_5H_7O_2N} = 0.53 \text{ g TOC/g } C_5H_7O_2N$$

$$\frac{COD}{TOC} = \frac{1.42}{0.53} = 2.68$$

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cf) CH₄ (methane) COD/TOC value



COD per g CH₄:

$$\frac{2 \times 32 \text{ g } O_2}{16 \text{ g } CH_4} = 4.0 \text{ g COD/g } CH_4$$

TOC per g CH₄:

$$\frac{1 \times 12 \text{ g } C}{16 \text{ g } CH_4} = 0.75 \text{ g TOC/g } CH_4$$

$$\frac{COD}{TOC} = \frac{4.0}{0.75} = 5.33$$

*COD/TOC ratio is much higher for CH₄ than for C₅H₇O₂N.
Can you find the reason why?*