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# Food to Microorganism Ratio or F to M Ratio Formulas

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# List of 20 Food to Microorganism Ratio or F to M Ratio Formulas

## Food to Microorganism Ratio or F to M Ratio



### 1) Biological Oxygen Demand Influent

$$fx \text{ BOD}_i = \frac{FM \cdot V \cdot X}{Q}$$

[Open Calculator](#) 

$$ex \text{ 0.000901mg/L} = \frac{0.001 \cdot 1.5\text{m}^3 \cdot 2.0\text{mg/L}}{3.33\text{m}^3}$$

### 2) BOD Influent given MLSS

$$fx \text{ } Q_i = \frac{\text{BOD} \cdot X \cdot V}{M_t \cdot Q}$$

[Open Calculator](#) 

$$ex \text{ 0.000901mg/L} = \frac{3.0\text{mg} \cdot 2.0\text{mg/L} \cdot 1.5\text{m}^3}{3\text{g} \cdot 3.33\text{m}^3}$$

### 3) BOD Load Applied given MLSS

$$fx \text{ BOD} = M_t \cdot \left( \frac{Q \cdot Q_i}{V \cdot X} \right)$$

[Open Calculator](#) 

$$ex \text{ 2.997mg} = 3\text{g} \cdot \left( \frac{3.33\text{m}^3 \cdot 0.0009\text{mg/L}}{1.5\text{m}^3 \cdot 2.0\text{mg/L}} \right)$$



#### 4) BOD Load applied to Aeration System

$$fx \quad BOD_a = Q \cdot Q_i$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235\_img.jpg\)](#)

$$ex \quad 2.997mg = 3.33m^3 \cdot 0.0009mg/L$$

#### 5) BOD of Influent Sewage given BOD Load Applied

$$fx \quad Q_i = \frac{BOD}{Q}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0\_img.jpg\)](#)

$$ex \quad 0.000901mg/L = \frac{3.0mg}{3.33m^3}$$

#### 6) Daily BOD Load given Food to Microorganism Ratio

$$fx \quad BOD = FM \cdot M_t$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f\_img.jpg\)](#)

$$ex \quad 3mg = 0.001 \cdot 3g$$


#### 7) Food to Microorganism Ratio

$$fx \quad FM = \frac{BOD}{M_t}$$

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754\_img.jpg\)](#)

$$ex \quad 0.001 = \frac{3.0mg}{3g}$$



8) Food to Microorganism Ratio given MLSS 

$$fx \quad FM = \frac{Q \cdot Q_i}{X \cdot V}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95\_img.jpg\)](#)


$$ex \quad 0.000999 = \frac{3.33m^3 \cdot 0.0009mg/L}{2.0mg/L \cdot 1.5m^3}$$

9) Microbial Mass in Aeration System 

$$fx \quad M_a = X \cdot V$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2\_img.jpg\)](#)


$$ex \quad 3000mg = 2.0mg/L \cdot 1.5m^3$$

10) Microbial Mass in Aeration System given MLSS 

$$fx \quad M_t = \frac{BOD}{\frac{Q \cdot Q_i}{V \cdot X}}$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7\_img.jpg\)](#)

$$ex \quad 3.003003g = \frac{3.0mg}{\frac{3.33m^3 \cdot 0.0009mg/L}{1.5m^3 \cdot 2.0mg/L}}$$

11) Mixed Liquor Suspended Solid 

$$fx \quad X = \frac{Q \cdot Q_i}{FM \cdot V}$$

[Open Calculator !\[\]\(899d8b7697d64725bf017d3296cfcf1b\_img.jpg\)](#)

$$ex \quad 1.998mg/L = \frac{3.33m^3 \cdot 0.0009mg/L}{0.001 \cdot 1.5m^3}$$



12) MLSS given BOD Load Applied to Aeration System 

$$fx \quad X = \frac{M_t \cdot Q \cdot Q_i}{V \cdot BOD}$$

Open Calculator 


$$ex \quad 1.998\text{mg/L} = \frac{3\text{g} \cdot 3.33\text{m}^3 \cdot 0.0009\text{mg/L}}{1.5\text{m}^3 \cdot 3.0\text{mg}}$$

13) MLSS given Microbial Mass in Aeration System 

$$fx \quad X = \left( \frac{M_t}{V} \right)$$

Open Calculator 

$$ex \quad 2\text{mg/L} = \left( \frac{3\text{g}}{1.5\text{m}^3} \right)$$

14) Sewage Flow given Food to Microorganism Ratio 

$$fx \quad Q = \frac{FM \cdot V \cdot X}{Q_i}$$

Open Calculator 

$$ex \quad 3.333333\text{m}^3 = \frac{0.001 \cdot 1.5\text{m}^3 \cdot 2.0\text{mg/L}}{0.0009\text{mg/L}}$$

15) Sewage Flow given MLSS 

$$fx \quad Q = \frac{BOD \cdot X \cdot V}{M_t \cdot Q_i}$$

Open Calculator 

$$ex \quad 3.333333\text{m}^3 = \frac{3.0\text{mg} \cdot 2.0\text{mg/L} \cdot 1.5\text{m}^3}{3\text{g} \cdot 0.0009\text{mg/L}}$$



16) Sewage Flow into Aeration System given BOD Load Applied 

$$fx \quad Q = \frac{BOD}{Q_i}$$

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0\_img.jpg\)](#)


$$ex \quad 3.333333m^3 = \frac{3.0mg}{0.0009mg/L}$$

17) Total Microbial Mass given Food to Microorganism Ratio 

$$fx \quad M_t = \frac{BOD}{FM}$$

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5\_img.jpg\)](#)


$$ex \quad 3g = \frac{3.0mg}{0.001}$$

18) Volume of Tank given Food to Microorganism Ratio 

$$fx \quad V = \frac{Q \cdot Q_i}{FM \cdot X}$$

[Open Calculator !\[\]\(ab4e2b3fc7e7887b7a72f548aa6f5e60\_img.jpg\)](#)

$$ex \quad 1.4985m^3 = \frac{3.33m^3 \cdot 0.0009mg/L}{0.001 \cdot 2.0mg/L}$$

19) Volume of Tank given Microbial Mass in Aeration System 

$$fx \quad V = \frac{M_t}{X}$$

[Open Calculator !\[\]\(5abce1a84a655b073239ab33e1199487\_img.jpg\)](#)

$$ex \quad 1.5m^3 = \frac{3g}{2.0mg/L}$$



20) Volume of Tank given MLSS [Open Calculator !\[\]\(feabb98897b440bc8695a03336a6e2df\_img.jpg\)](#)

$$\text{fx } V = \frac{M_t \cdot Q \cdot Q_i}{X \cdot \text{BOD}}$$

$$\text{ex } 1.4985\text{m}^3 = \frac{3\text{g} \cdot 3.33\text{m}^3 \cdot 0.0009\text{mg/L}}{2.0\text{mg/L} \cdot 3.0\text{mg}}$$






## Variables Used

- **BOD** Daily BOD (Milligram)
- **BOD<sub>a</sub>** BOD Load applied to Aeration System (Milligram)
- **BOD<sub>i</sub>** Biological Oxygen Demand (Milligram per Liter)
- **FM** Food to Microorganism Ratio
- **M<sub>a</sub>** Microbial Mass in Aeration System (Milligram)
- **M<sub>t</sub>** Total Microbial Mass (Gram)
- **Q** Sewage Flow (Cubic Meter)
- **Q<sub>i</sub>** Influent BOD (Milligram per Liter)
- **V** Volume of Tank (Cubic Meter)
- **X** MLSS (Milligram per Liter)





## Constants, Functions, Measurements used

- **Measurement: Weight** in Milligram (mg), Gram (g)  
*Weight Unit Conversion* 
- **Measurement: Volume** in Cubic Meter (m<sup>3</sup>)  
*Volume Unit Conversion* 
- **Measurement: Density** in Milligram per Liter (mg/L)  
*Density Unit Conversion* 



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- [Design of Conical Humus Tank Formulas](#) 
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