

# Important Food is to Microorganism Ratio or F is to M Ratio Formulas PDF



## Formulas Examples with Units

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

### 1) Biological Oxygen Demand Influent Formula

Formula

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

Example with Units

$$0.0009 \text{ mg/L} = \frac{0.001 \cdot 1.5 \text{ m}^3 \cdot 2.0 \text{ mg/L}}{3.33 \text{ m}^3}$$

Evaluate Formula

### 2) BOD Influent given MLSS Formula

Formula

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

Example with Units

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

Evaluate Formula

### 3) BOD Load Applied given MLSS Formula

Formula

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

Example with Units

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

Evaluate Formula

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

Formula

$$\text{BOD}_a = \text{Q} \cdot \text{Q}_i$$

Example with Units

$$2.997 \text{ mg} = 3.33 \text{ m}^3 \cdot 0.0009 \text{ mg/L}$$

Evaluate Formula

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

Formula

$$Q_i = \frac{\text{BOD}}{\text{Q}}$$

Example with Units

$$0.0009 \text{ mg/L} = \frac{3.0 \text{ mg}}{3.33 \text{ m}^3}$$

Evaluate Formula

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

Formula

$$\text{BOD} = \text{FM} \cdot M_t$$

Example with Units

$$3 \text{ mg} = 0.001 \cdot 3 \text{ g}$$

Evaluate Formula



## 7) Food to Microorganism Ratio Formula ↻

Formula

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

Example with Units

$$0.001 = \frac{3.0 \text{ mg}}{3 \text{ g}}$$

Evaluate Formula ↻

## 8) Food to Microorganism Ratio given MLSS Formula ↻

Formula

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

Example with Units

$$0.001 = \frac{3.33 \text{ m}^3 \cdot 0.0009 \text{ mg/L}}{2.0 \text{ mg/L} \cdot 1.5 \text{ m}^3}$$

Evaluate Formula ↻

## 9) Microbial Mass in Aeration System Formula ↻

Formula

$$M_a = X \cdot V$$

Example with Units

$$3000 \text{ mg} = 2.0 \text{ mg/L} \cdot 1.5 \text{ m}^3$$

Evaluate Formula ↻

## 10) Microbial Mass in Aeration System given MLSS Formula ↻

Formula

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

Example with Units

$$3.003 \text{ g} = \frac{3.0 \text{ mg}}{\frac{3.33 \text{ m}^3 \cdot 0.0009 \text{ mg/L}}{1.5 \text{ m}^3 \cdot 2.0 \text{ mg/L}}}$$

Evaluate Formula ↻

## 11) Mixed Liquor Suspended Solid Formula ↻

Formula

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

Example with Units

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

Evaluate Formula ↻

## 12) MLSS given BOD Load Applied to Aeration System Formula ↻

Formula

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

Example with Units

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

Evaluate Formula ↻

## 13) MLSS given Microbial Mass in Aeration System Formula ↻

Formula

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

Example with Units

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

Evaluate Formula ↻



#### 14) Sewage Flow given Food to Microorganism Ratio Formula

Formula

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

Example with Units

$$3.3333 \text{ m}^3 = \frac{0.001 \cdot 1.5 \text{ m}^3 \cdot 2.0 \text{ mg/L}}{0.0009 \text{ mg/L}}$$

Evaluate Formula 

#### 15) Sewage Flow given MLSS Formula

Formula

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

Example with Units

$$3.3333 \text{ m}^3 = \frac{3.0 \text{ mg} \cdot 2.0 \text{ mg/L} \cdot 1.5 \text{ m}^3}{3 \text{ g} \cdot 0.0009 \text{ mg/L}}$$

Evaluate Formula 

#### 16) Sewage Flow into Aeration System given BOD Load Applied Formula

Formula

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

Example with Units

$$3.3333 \text{ m}^3 = \frac{3.0 \text{ mg}}{0.0009 \text{ mg/L}}$$

Evaluate Formula 

#### 17) Total Microbial Mass given Food to Microorganism Ratio Formula

Formula

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

Example with Units

$$3 \text{ g} = \frac{3.0 \text{ mg}}{0.001}$$

Evaluate Formula 

#### 18) Volume of Tank given Food to Microorganism Ratio Formula

Formula

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

Example with Units

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

Evaluate Formula 

#### 19) Volume of Tank given Microbial Mass in Aeration System Formula

Formula

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

Example with Units

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

Evaluate Formula 

#### 20) Volume of Tank given MLSS Formula

Formula

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

Example with Units

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




Evaluate Formula 



## Variables used in list of Food is to Microorganism Ratio or F is to M Ratio Formulas above






- **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 in list of Food is to Microorganism Ratio or F is to M Ratio Formulas above


- **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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