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Salinity Variations with Tide Formulas

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List of 19 Salinity Variations with Tide Formulas

Salinity Variations with Tide

1) Apparent Dispersion Coefficient which includes all Mixing Effects

Open Calculator

fx $$D = \frac{D_0 \cdot B}{x + B}$$

ex $$0.6 = \frac{3.15 \cdot 4\text{m}}{17\text{m} + 4\text{m}}$$

2) Coordinate along Channel given Apparent Dispersion Coefficient

Open Calculator

fx $$x = \left(D_0 \cdot \frac{B}{D}\right) - B$$

ex $$17\text{m} = \left(3.15 \cdot \frac{4\text{m}}{0.6}\right) - 4\text{m}$$

3) Diffusion Coefficient

Open Calculator

fx $$D_0 = D \cdot \frac{x + B}{B}$$

ex $$3.15 = 0.6 \cdot \frac{17\text{m} + 4\text{m}}{4\text{m}}$$

4) Dimensionless Estuary number

Open Calculator

fx $$E = \frac{P \cdot Fr^2}{Q_r \cdot T}$$

ex $$6.153846 = \frac{40\text{m}^3 \cdot (10)^2}{5\text{m}^3/\text{s} \cdot 130\text{s}}$$

5) Dimensionless Stratification Number

Open Calculator

$$n = \frac{r}{p}$$

$$2.5 = \frac{45}{18}$$

6) Estuary Number given Froude Number and Mixing Parameter

Open Calculator

$$E = \frac{Fr^2}{M}$$

$$6.153846 = \frac{(10)^2}{16.25}$$

7) Fresh Water River Flow given Dimensionless Estuary number

Open Calculator

$$Q_r = \frac{P \cdot Fr^2}{E \cdot T}$$

$$4.999875\text{m}^3/\text{s} = \frac{40\text{m}^3 \cdot (10)^2}{6.154 \cdot 130\text{s}}$$

8) Fresh Water River Flow given Mixing Parameter

Open Calculator

$$Q_r = \frac{M \cdot P}{T}$$

$$5\text{m}^3/\text{s} = \frac{16.25 \cdot 40\text{m}^3}{130\text{s}}$$

9) Froude Number based upon Maximum Flood Current Velocity at Estuary Mouth

Open Calculator

$$Fr = \sqrt{E \cdot M}$$

$$10.00012 = \sqrt{6.154 \cdot 16.25}$$

10) Froude Number given Dimensionless Estuary Number

Open Calculator

$$\mathrm{Fr} = \sqrt{\frac{\mathrm{E} \cdot \mathrm{Q_r} \cdot \mathrm{T}}{\mathrm{P}}}$$

$$10.00012 = \sqrt{\frac{6.154 \cdot 5\mathrm{m^3/s} \cdot 130\mathrm{s}}{40\mathrm{m^3}}}$$

11) Mixing Parameter

Open Calculator

$$\mathrm{M} = \frac{\mathrm{Q_r} \cdot \mathrm{T}}{\mathrm{P}}$$

$$16.25 = \frac{5\mathrm{m^3/s} \cdot 130\mathrm{s}}{40\mathrm{m^3}}$$

12) Mixing Parameter given Dimensionless Estuary Number

Open Calculator

$$\mathrm{M} = \frac{\mathrm{Fr}^2}{\mathrm{E}}$$

$$16.24959 = \frac{(10)^2}{6.154}$$

13) Rate of Energy Dissipation given Dimensionless Stratification Number

Open Calculator

$$\mathrm{r} = \mathrm{n} \cdot \mathrm{p}$$

$$45 = 2.5 \cdot 18$$

14) Rate of Potential Energy Gain given Dimensionless Stratification Number

Open Calculator

$$\mathrm{p} = \frac{\mathrm{r}}{\mathrm{n}}$$

$$18 = \frac{45}{2.5}$$

15) Salinity at Moment of Slack Water

Open Calculator

$$Ss = S \cdot \exp\left(-\left(18 \cdot 10^{-6}\right) \cdot Q_r \cdot x^2 - \left(0.045 \cdot Q_r^{0.5}\right)\right)$$

ex

$$0.029366 = 33.33\text{mg/L} \cdot \exp\left(-\left(18 \cdot 10^{-6}\right) \cdot 5\text{m}^3\text{/s} \cdot (17\text{m})^2 - \left(0.045 \cdot (5\text{m}^3\text{/s})^{0.5}\right)\right)$$

16) Tidal Period given Mixing Parameter

Open Calculator

$$T = \frac{M \cdot P}{Q_r}$$

ex

$$130\text{s} = \frac{16.25 \cdot 40\text{m}^3}{5\text{m}^3\text{/s}}$$

17) Tide Period given Dimensionless Estuary number

Open Calculator

$$T = \frac{P \cdot Fr^2}{E \cdot Q_r}$$

ex

$$129.9968\text{s} = \frac{40\text{m}^3 \cdot (10)^2}{6.154 \cdot 5\text{m}^3\text{/s}}$$

18) Volume of Tidal Prism given Dimensionless Estuary Number

Open Calculator

$$P = \frac{E \cdot Q_r \cdot T}{Fr^2}$$

ex

$$40.001\text{m}^3 = \frac{6.154 \cdot 5\text{m}^3\text{/s} \cdot 130\text{s}}{(10)^2}$$

19) Volume of Tidal Prism given Mixing Parameter

Open Calculator

fx $$P = \frac{Q_r \cdot T}{M}$$

ex $$40\text{m}^3 = \frac{5\text{m}^3/\text{s} \cdot 130\text{s}}{16.25}$$

Variables Used

- **B** Distance Outside the Estuary *(Meter)*
- **D** Apparent Dispersion Coefficient
- **D_0** Diffusion Coefficient at x=0
- **E** Estuary Number
- **Fr** Froude Number
- **M** Mixing Parameter
- **n** Stratification Number
- **p** Rate of Potential Energy Gain
- **P** Volume of Tidal Prism *(Cubic Meter)*
- **Q_r** Fresh Water River Flow *(Cubic Meter per Second)*
- **r** Rate of Energy Dissipation
- **S** Salinity of Water *(Milligram per Liter)*
- **Ss** Salinity at the Moment of Slack Water
- **T** Tidal Period *(Second)*
- **x** Coordinate along the Channel *(Meter)*

Constants, Functions, Measurements used

- Function: **exp**, exp(Number)
  n an exponential function, the value of the function changes by a constant factor for every unit change in the independent variable.
- Function: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Time** in Second (s)
  Time Unit Conversion
- Measurement: **Volume** in Cubic Meter (m^3)
  Volume Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m^3/s)
  Volumetric Flow Rate Unit Conversion
- Measurement: **Density** in Milligram per Liter (mg/L)
  Density Unit Conversion

Check other formula lists

- **Salinity Variations with Tide Formulas**

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