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Losses from Precipitation Formulas

Calculators! Examples! Conversions!

List of 25 Losses from Precipitation Formulas

Losses from Precipitation

Determination of Evapotranspiration

1) Consumptive Use of Water for Large Areas

Open Calculator

fx $$Cu = I + P_{mm} + (G_s - G_e) - V_o$$

ex $$45.035 m^3/s = 20 m^3/s + 35 mm + (80 m^3 - 30 m^3) - 25 m^3$$

2) Equation for Constant depending upon Latitude in Net Radiation of Evaporable Water Equation

Open Calculator

fx $$a = 0.29 \cdot \cos(\Phi)$$

ex $$0.145 = 0.29 \cdot \cos(60°)$$

3) Equation for Parameter Including Wind Velocity and Saturation Deficit

Open Calculator

fx $$E_a = 0.35 \cdot \left(1 + \left(\frac{W_v}{160}\right)\right) \cdot (e_s - e_a)$$

ex $$5.089636 = 0.35 \cdot \left(1 + \left(\frac{2 cm/s}{160}\right)\right) \cdot (17.54 mmHg - 3 mmHg)$$

4) Transpiration ratio

Open Calculator

fx $$T = \frac{W_w}{W_m}$$

ex $$2.5 = \frac{5 kg}{2.0 kg}$$

5) Water Consumed by Transpiration

Open Calculator

fx $$W_t = (W_1 + W) - W_2$$

ex $$6 kg = (8 kg + 2 kg) - 4 kg$$

Evaporation

6) Dalton's Law of Evaporation

Open Calculator

fx $E = K_o \cdot (e_s - e_a)$

ex $2907.753 = 1.5 \cdot (17.54\text{mmHg} - 3\text{mmHg})$

7) Dalton-Type Equation

Open Calculator

fx $E_{lake} = K \cdot f_u \cdot (e_s - e_a)$

ex $12.359 = 0.5 \cdot 1.7 \cdot (17.54\text{mmHg} - 3\text{mmHg})$

8) Meyers formula (1915)

Open Calculator

fx $E_{lake} = K_m \cdot (e_s - e_a) \cdot \left(1 + \frac{u_9}{16}\right)$

ex $12.39898 = 0.36 \cdot (17.54\text{mmHg} - 3\text{mmHg}) \cdot \left(1 + \frac{21.9\text{km/h}}{16}\right)$

9) Rohwers formula (1931)

Open Calculator

fx $E_{lake} = 0.771 \cdot (1.465 - 0.00073 \cdot P_a) \cdot (0.44 + 0.0733 \cdot u_0) \cdot (e_s - e_a)$

ex $12.37788 = 0.771 \cdot (1.465 - 0.00073 \cdot 4\text{mmHg}) \cdot (0.44 + 0.0733 \cdot 4.3\text{km/h}) \cdot (17.54\text{mmHg} - 3\text{mmHg})$

10) Vapour Pressure of Air using Dalton's Law

Open Calculator

fx $e_a = e_s - \left(\frac{E}{K_o}\right)$

ex $3.003764\text{mmHg} = 17.54\text{mmHg} - \left(\frac{2907}{1.5}\right)$

11) Vapour Pressure of Water at given Temperature for Evaporation in Water Bodies

Open Calculator

fx $e_s = \left(\frac{E}{K_o}\right) + e_a$

ex $17.53624\text{mmHg} = \left(\frac{2907}{1.5}\right) + 3\text{mmHg}$

Interception

12) Duration of Rainfall given Interception Loss

Open Calculator

fx $$t = \frac{I_i - S_i}{K_i \cdot E_r}$$

ex $$1.5\text{h} = \frac{8.7\text{mm} - 1.2\text{mm}}{2 \cdot 2.5\text{mm/h}}$$

13) Evaporation Rate given Interception Loss

Open Calculator

fx $$E_r = \frac{I_i - S_i}{K_i \cdot t}$$

ex $$2.5\text{mm/h} = \frac{8.7\text{mm} - 1.2\text{mm}}{2 \cdot 1.5\text{h}}$$

14) Interception Loss

Open Calculator

fx $$I_i = S_i + (K_i \cdot E_r \cdot t)$$

ex $$1.200002\text{mm} = 1.2\text{mm} + (2 \cdot 2.5\text{mm/h} \cdot 1.5\text{h})$$

15) Interception Storage given Interception Loss

Open Calculator

fx $$S_i = I_i - (K_i \cdot E_r \cdot t)$$

ex $$1.2\text{mm} = 8.7\text{mm} - (2 \cdot 2.5\text{mm/h} \cdot 1.5\text{h})$$

16) Ratio of Vegetal Surface Area to its Projected Area given Interception Loss

Open Calculator

fx $$K_i = \frac{I_i - S_i}{E_r \cdot t}$$

ex $$2 = \frac{8.7\text{mm} - 1.2\text{mm}}{2.5\text{mm/h} \cdot 1.5\text{h}}$$

Measurement of Evaporation

Budget Method

17) Bowen's Ratio

Open Calculator

fx $$\beta = \frac{H_a}{\rho_{water} \cdot L \cdot E_L}$$

ex $$0.05102 = \frac{20J}{1000kg/m^3 \cdot 7J/kg \cdot 56mm}$$

18) Energy Balance to Evaporating Surface for Period of One Day

Open Calculator

fx $$H_n = H_a + H_e + H_g + H_s + H_i$$

ex $$388.21W/m^2 = 20J + 336W/m^2 + 0.21W/m^2 + 22.0W/m^2 + 10W/m^2$$

19) Evaporation from Energy Budget Method

Open Calculator

fx $$E_L = \frac{H_n - H_g - H_s - H_i}{\rho_{water} \cdot L \cdot (1 + \beta)}$$

ex $$48.26889mm = \frac{388W/m^2 - 0.21W/m^2 - 22.0W/m^2 - 10W/m^2}{1000kg/m^3 \cdot 7J/kg \cdot (1 + 0.053)}$$

20) Heat Energy used up in Evaporation

Open Calculator

fx $$H_e = \rho_{water} \cdot L \cdot E_L$$

ex $$392W/m^2 = 1000kg/m^3 \cdot 7J/kg \cdot 56mm$$

Reservoir Evaporation and Methods of Reduction

21) Average Reservoir Area during Month given Volume of Water Lost in Evaporation

Open Calculator

fx $$A_R = \frac{V_E}{E_{pm} \cdot C_p}$$

ex $$10m^2 = \frac{56m^3}{16m \cdot 0.35}$$

22) Pan Evaporation Loss

Open Calculator

$$E_{pm} = E_{lake} \cdot n \cdot 10^{-3}$$

$$0.369\text{m} = 12.3 \cdot 30 \cdot 10^{-3}$$

23) Pan Evaporation Loss given Volume of Water Lost in Evaporation in Month

Open Calculator

$$E_{pm} = \frac{V_E}{A_R \cdot C_p}$$

$$16\text{m} = \frac{56\text{m}^3}{10\text{m}^2 \cdot 0.35}$$

24) Relevant Pan Coefficient given Volume of Water Lost in Evaporation in Month

Open Calculator

$$C_p = \frac{V_E}{A_R \cdot E_{pm}}$$

$$0.35 = \frac{56\text{m}^3}{10\text{m}^2 \cdot 16\text{m}}$$

25) Volume of Water Lost in Evaporation in Month

Open Calculator

$$V_E = A_R \cdot E_{pm} \cdot C_p$$

$$56\text{m}^3 = 10\text{m}^2 \cdot 16\text{m} \cdot 0.35$$

Variables Used

- **a** Constant depending on Latitude
- **A_R** Average Reservoir Area *(Square Meter)*
- **C_p** Relevant Pan Coefficient
- **Cu** Consumptive Use of Water for Large Areas *(Cubic Meter per Second)*
- **E** Evaporation from Water Body
- **e_a** Actual Vapour Pressure *(Millimeter Mercury (0 °C))*
- **E_a** Actual Mean Vapor Pressure
- **E_L** Daily Lake Evaporation *(Millimeter)*
- **E_{lake}** Lake Evaporation
- **E_{pm}** Pan Evaporation Loss *(Meter)*
- **E_r** Evaporation Rate *(Millimeter per Hour)*
- **e_s** Saturation Vapour Pressure *(Millimeter Mercury (0 °C))*
- **f_u** Wind Speed Correction Factor
- **G_e** Ground Water Storage at the End *(Cubic Meter)*
- **G_s** Ground Water Storage *(Cubic Meter)*
- **H_a** Sensible Heat Transfer from Water Body *(Joule)*
- **H_e** Heat Energy used up in Evaporation *(Watt per Square Meter)*
- **H_g** Heat Flux into the Ground *(Watt per Square Meter)*
- **H_i** Net Heat Conducted out system by Water Flow *(Watt per Square Meter)*
- **H_n** Net Heat Received by Water Surface *(Watt per Square Meter)*
- **H_s** Head Stored in Water Body *(Watt per Square Meter)*
- **I** Inflow *(Cubic Meter per Second)*
- **I_i** Interception Loss *(Millimeter)*
- **K** Coefficient
- **K_i** Ratio of Vegetal Surface Area to Projected Area
- **K_m** Coefficient Accounting for Other Factors
- **K_o** Proportionality Constant
- **L** Latent Heat of Evaporation *(Joule per Kilogram)*
- **n** Number of Days in a Month
- **P_a** Atmospheric Pressure *(Millimeter Mercury (0 °C))*
- **P_{mm}** Precipitation *(Millimeter)*

- S_i Interception Storage *(Millimeter)*
- t Duration of the Rainfall *(Hour)*
- T Transpiration Ratio
- u_0 Mean Wind Velocity at Ground Level *(Kilometer per Hour)*
- u_9 Monthly Mean Wind Velocity *(Kilometer per Hour)*
- V_E Volume of Water Lost in Evaporation *(Cubic Meter)*
- V_o Mass Outflow *(Cubic Meter)*
- W Amount of Water applied during Growth *(Kilogram)*
- W_1 Entire Plant Set Up Weighed in the Beginning *(Kilogram)*
- W_2 Entire Plant Set Up Weighed at the End *(Kilogram)*
- W_m Weight of Dry Mass produced *(Kilogram)*
- W_t Water Consumed by Transpiration *(Kilogram)*
- W_v Mean Wind Velocity *(Centimeter per Second)*
- W_w Weight of Water Transpired *(Kilogram)*
- β Bowen's Ratio
- ρ_{water} Water Density *(Kilogram per Cubic Meter)*
- Φ Latitude *(Degree)*

Constants, Functions, Measurements used

- Function: **cos**, cos(Angle)
  Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.
- Measurement: **Length** in Millimeter (mm), Meter (m)
  Length Unit Conversion
- Measurement: **Weight** in Kilogram (kg)
  Weight Unit Conversion
- Measurement: **Time** in Hour (h)
  Time Unit Conversion
- Measurement: **Volume** in Cubic Meter (m^3)
  Volume Unit Conversion
- Measurement: **Area** in Square Meter (m^2)
  Area Unit Conversion
- Measurement: **Pressure** in Millimeter Mercury (0 °C) (mmHg)
  Pressure Unit Conversion
- Measurement: **Speed** in Centimeter per Second (cm/s), Kilometer per Hour (km/h), Millimeter per Hour (mm/h)
  Speed Unit Conversion
- Measurement: **Energy** in Joule (J)
  Energy Unit Conversion
- Measurement: **Angle** in Degree (°)
  Angle Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m^3/s)
  Volumetric Flow Rate Unit Conversion
- Measurement: **Heat Flux Density** in Watt per Square Meter (W/m^2)
  Heat Flux Density Unit Conversion
- Measurement: **Density** in Kilogram per Cubic Meter (kg/m^3)
  Density Unit Conversion
- Measurement: **Latent Heat** in Joule per Kilogram (J/kg)
  Latent Heat Unit Conversion

Check other formula lists

- **Abstractions from Precipitation Formulas**
- **Area, Velocity and Ultrasonic Method of Streamflow Measurement Formulas**
- **Discharge Measurements Formulas**
- **Indirect Methods of Streamflow Measurement Formulas**
- **Losses from Precipitation Formulas**
- **Measurement of Evapotranspiration Formulas**
- **Precipitation Formulas**
- **Streamflow Measurement Formulas**
- **Water Budget Equation for a Catchment Formulas**

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