Losses from Precipitation Formulas

List of 25 Losses from Precipitation Formulas

Losses from Precipitation

Determination of Evapotranspiration

1) Consumptive Use of Water for Large Areas

Open Calculator

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

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

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

Open Calculator

fx $$\mathrm{a} = 0.29 \cdot \cos(\Phi)$$

ex $$0.145 = 0.29 \cdot \cos(60^\circ)$$

3) Equation for Parameter Including Wind Velocity and Saturation Deficit

Open Calculator

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

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

4) Transpiration ratio

Open Calculator

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

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

5) Water Consumed by Transpiration

Open Calculator

fx $$\mathrm{W_t} = (\mathrm{W_1} + \mathrm{W}) - \mathrm{W_2}$$

ex $$6\mathrm{kg} = (8\mathrm{kg} + 2\mathrm{kg}) - 4\mathrm{kg}$$

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

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