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Acidity and pH Scale Formulas

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List of 14 Acidity and pH Scale Formulas

Acidity and pH Scale

1) Activity of Hydrogen Ion given pH

Open Calculator

fx $aH^+ = 10^{-pH}$

ex $1E^{-9}mol/L = 10^{-6}$

2) Concentration of Hydrogen Ion given pH

Open Calculator

fx $H^+ = 10^{-pH}$

ex $1E^{-6}mol/L = 10^{-6}$

3) Concentration of Hydroxyl Ion given pOH

Open Calculator

fx $OH^- = 10^{-pOH}$

ex $1E^{-8}mol/L = 10^{-8}$

4) Dissociation Constant of Weak Acid given pKa

Open Calculator

fx $K_a = 10^{-pK_a}$

ex $1E^{-5} = 10^{-5}$

5) Dissociation Constant of Weak Base given pKb

Open Calculator

fx $$K_b = 10^{-pK_b}$$

ex $$1E\hat{}\text{-}10 = 10^{-10}$$

6) pH given Activity of Hydrogen Ion

Open Calculator

fx $$pH = -\log 10\left(aH^{+}\right)$$

ex $$6 = -\log 10(1E\hat{}\text{-}9mol/L)$$

7) pH given Concentration of Hydrogen Ion

Open Calculator

fx $$pH = -\log 10\left(H^{+}\right)$$

ex $$6 = -\log 10(1E\hat{}\text{-}6mol/L)$$

8) pH of Mixture of Strong Acid and Strong Base when Solution is Acidic in Nature

Open Calculator

fx $$pH = -\log 10\left(\frac{N_1 \cdot V_1 - N_2 \cdot V_2}{V_1 + V_2}\right)$$

ex $$3.367977 = -\log 10\left(\frac{0.0008Eq/L \cdot 0.00025L - 0.0005Eq/L \cdot 0.0001L}{0.00025L + 0.0001L}\right)$$

9) pH of Mixture of Two Strong Acids

Open Calculator

$$\text{pH} = -\log 10\left(\frac{\text{N}_1 \cdot \text{V}_1 + \text{N}_2 \cdot \text{V}_2}{\text{V}_1 + \text{V}_2}\right)$$

ex

$$3.146128 = -\log 10\left(\frac{0.0008\text{Eq/L} \cdot 0.00025\text{L} + 0.0005\text{Eq/L} \cdot 0.0001\text{L}}{0.00025\text{L} + 0.0001\text{L}}\right)$$

10) pKa given Dissociation Constant of Weak Acid

Open Calculator

$$\text{pK}_\text{a} = -\log 10(\text{K}_\text{a})$$

ex $5 = -\log 10(1\text{E}\hat{}\text{-}5)$

11) pKb given Dissociation constant of Weak Base

Open Calculator

$$\text{pK}_\text{b} = -\log 10(\text{K}_\text{b})$$

ex $10 = -\log 10(1\text{E}\hat{}\text{-}10)$

12) pOH given Concentration of Hydroxyl Ion

Open Calculator

$$\text{pOH} = -\log 10(\text{OH}^-)$$

ex $8 = -\log 10(1\text{E}\hat{}\text{-}8\text{mol/L})$

13) pOH of Mixture of Strong Acid and Strong Base when Solution is Basic in Nature

Open Calculator

fx $$\mathrm{pOH} = 14 + \log 10\left(\frac{\mathrm{N_1}\cdot \mathrm{V_1} - \mathrm{N_2}\cdot \mathrm{V_2}}{\mathrm{V_1} + \mathrm{V_2}}\right)$$

ex $$13.63202 = 14 + \log 10\left(\frac{0.0008\mathrm{Eq/L}\cdot 0.00025\mathrm{L} - 0.0005\mathrm{Eq/L}\cdot 0.0001\mathrm{L}}{0.00025\mathrm{L} + 0.0001\mathrm{L}}\right)$$

14) pOH of Mixture of Two Strong Bases

Open Calculator

fx $$\mathrm{pOH} = -\log 10\left(\frac{\mathrm{N_1}\cdot \mathrm{V_1} + \mathrm{N_2}\cdot \mathrm{V_2}}{\mathrm{V_1} + \mathrm{V_2}}\right)$$

ex $$3.146128 = -\log 10\left(\frac{0.0008\mathrm{Eq/L}\cdot 0.00025\mathrm{L} + 0.0005\mathrm{Eq/L}\cdot 0.0001\mathrm{L}}{0.00025\mathrm{L} + 0.0001\mathrm{L}}\right)$$

Variables Used

- aH^+ Activity of Hydrogen Ion *(Mole per Liter)*
- H^+ Concentration of Hydrogen Ion *(Mole per Liter)*
- K_a Dissociation Constant of Weak Acid
- K_b Dissociation Constant of Weak Base
- N_1 Normality of Solution 1 *(Equivalents per Liter)*
- N_2 Normality of Solution 2 *(Equivalents per Liter)*
- OH^- Concentration of Hydroxyl Ion *(Mole per Liter)*
- pH Negative Log of Hydronium Concentration
- pK_a Negative Log of Acid Ionization Constant
- pK_b Negative Log of Base Ionization Constant
- pOH Negative Log of Hydroxyl Concentration
- V_1 Volume of Solution 1 *(Liter)*
- V_2 Volume of Solution 2 *(Liter)*

Constants, Functions, Measurements used

- Function: **log10**, log10(Number)
  Common logarithm function (base 10)
- Measurement: **Volume** in Liter (L)
  Volume Unit Conversion
- Measurement: **Molar Concentration** in Mole per Liter (mol/L), Equivalents per Liter (Eq/L)
  Molar Concentration Unit Conversion

Check other formula lists

- **Acidity and pH Scale Formulas**
- **Buffer Solution Formulas**
- **Ostwald Dilution Law Formulas**
- **Relative Strength of Two Acids Formulas**

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