Important Van't Hoff Factor Formulas PDF

Formulas
Examples
with Units

List of 19
Important Van't Hoff Factor Formulas

1) Apparent Molar Mass given Van't Hoff factor Formula

Evaluate Formula

Formula

$$M_{obs} = \frac{M_{theoretical}}{i}$$

Example with Units

$$49.6032\,\text{kg/mol} = \frac{50\,\text{kg/mol}}{1.008}$$

2) Degree of Association given Van't Hoff Factor Formula

Evaluate Formula

Formula

$$\beta = \frac{i_{\beta} - 1}{\left(\frac{1}{N_{ions}}\right) - 1}$$

Example

$$0.5 = \frac{0.75 - 1}{\left(\frac{1}{2}\right) - 1}$$

3) Degree of Dissociation given Van't Hoff Factor Formula

Evaluate Formula

Formula

$$\alpha = \frac{i - 1}{N_{ions} - 1}$$

Example

$$0.008 = \frac{1.008 - 1}{2 - 1}$$

4) Experimental Osmotic Pressure given Van't Hoff Factor Formula

Evaluate Formula

Formula

$$\pi_{exp} = i \cdot \pi_{theoretical}$$

Example with Units

$$15.12\,\text{atm} = 1.008 \cdot 15\,\text{atm}$$

5) Formula Mass given Van't Hoff Factor Formula

Evaluate Formula

Formula

$$M_{theoretical} = i \cdot M_{obs}$$

Example with Units

$$49.9998\,\text{kg/mol} = 1.008 \cdot 49.603\,\text{kg/mol}$$

6) Observed Molality given Van't Hoff Factor Formula

Evaluate Formula

Formula

$$m_{obs} = i \cdot m_{theoretical}$$

Example with Units

$$1.512\,\text{mol/kg} = 1.008 \cdot 1.5\,\text{mol/kg}$$

7) Observed Number of Particles given Van't Hoff Factor Formula

Evaluate Formula

Formula

$$n_{obs} = i \cdot n_{theoretical}$$

Example

$$6.048 = 1.008 \cdot 6$$

8) Observed or Experimental Value of Colligative Property given Van't Hoff Factor Formula

Evaluate Formula

Formula

$$\text{Colligative Property}_{exp} = i \cdot \text{Colligative Property}_{theoretical}$$

Example

$$5.04 = 1.008 \cdot 5$$

9) Theoretical Molality given Van't Hoff Factor Formula

Evaluate Formula

Formula

$$m_{theoretical} = \frac{m_{obs}}{i}$$

Example with Units

$$1.5\,\text{mol/kg} = \frac{1.512\,\text{mol/kg}}{1.008}$$

10) Theoretical Number of Particles given Van't Hoff Factor Formula

Evaluate Formula

Formula

$$n_{theoretical} = \frac{n_{obs}}{i}$$

Example

$$6 = \frac{6.048}{1.008}$$

11) Theoretical Osmotic Pressure given Van't Hoff Factor Formula

Evaluate Formula

Formula

$$\pi_{theoretical} = \frac{\pi_{exp}}{i}$$

Example with Units

$$15\,\text{atm} = \frac{15.12\,\text{atm}}{1.008}$$

12) Theoretical Value of Colligative Property given Van't Hoff Factor Formula

Evaluate Formula

Formula

$$\text{Colligative Property}_{theoretical} = \frac{\text{Colligative Property}_{exp}}{i}$$

Example

$$5 = \frac{5.04}{1.008}$$

13) Van't Hoff Factor given Colligative Property Formula

Evaluate Formula

Formula

$$i = \frac{\text{Colligative Property}_{exp}}{\text{Colligative Property}_{theoretical}}$$

Example

$$1.008 = \frac{5.04}{5}$$

14) Van't Hoff Factor given Degree of Association Formula

Evaluate Formula

Formula

$$i_{\beta} = 1 + \left(\left(\left(\frac{1}{N_{ions}}\right) - 1\right) \cdot \beta\right)$$

Example

$$0.75 = 1 + \left(\left(\left(\frac{1}{2}\right) - 1\right) \cdot 0.5\right)$$

15) Van't Hoff Factor given Degree of Dissociation Formula

Evaluate Formula

Formula

$$i = 1 + \left(\left(N_{ions} - 1 \right) \cdot \alpha \right)$$

Example

$$1.008 = 1 + \left(\left(2 - 1 \right) \cdot 0.008 \right)$$

16) Van't Hoff Factor given Experimental and Theoretical Osmotic Pressure Formula

Evaluate Formula

Formula

$$i = \frac{\pi_{exp}}{\pi_{theoretical}}$$

Example with Units

$$1.008 = \frac{15.12\,\text{atm}}{15\,\text{atm}}$$

17) Van't Hoff Factor given Molality Formula

Evaluate Formula

Formula

$$i = \frac{m_{obs}}{m_{theoretical}}$$

Example with Units

$$1.008 = \frac{1.512\,\text{mol/kg}}{1.5\,\text{mol/kg}}$$

18) Van't Hoff Factor given Molar Mass Formula

Evaluate Formula

Formula

$$i = \frac{M_{theoretical}}{M_{obs}}$$

Example with Units

$$1.008 = \frac{50\,\text{kg/mol}}{49.603\,\text{kg/mol}}$$

19) Van't Hoff Factor given Number of Particles Formula

Evaluate Formula

Formula

$$i = \frac{n_{obs}}{n_{theoretical}}$$

Example

$$1.008 = \frac{6.048}{6}$$

Variables used in list of Van't Hoff Factor Formulas above

- **Colligative Property$_{exp}$** Experimental Value of Colligative Property
- **Colligative Property$_{theoretical}$** Theoretical Value of Colligative Property
- **i** Van't Hoff Factor
- **i_{β}** Van't Hoff Factor for Degree of Association
- **m_{obs}** Observed Molality *(Mole per Kilogram)*
- **M_{obs}** Apparent Molar Mass *(Kilogram Per Mole)*
- **$m_{theoretical}$** Theoretical Molality *(Mole per Kilogram)*
- **$M_{theoretical}$** Formula Mass *(Kilogram Per Mole)*
- **N_{ions}** Number of Ions
- **n_{obs}** Observed Number of Particles
- **$n_{theoretical}$** Theoretical Number of Particles
- **α** Degree of Dissociation
- **β** Degree of Association
- **π_{exp}** Experimental Osmotic Pressure *(Standard Atmosphere)*
- **$\pi_{theoretical}$** Theoretical Osmotic Pressure *(Standard Atmosphere)*

Constants, Functions, Measurements used in list of Van't Hoff Factor Formulas above

- Measurement: **Pressure** in Standard Atmosphere (atm)
  Pressure Unit Conversion
- Measurement: **Molar Mass** in Kilogram Per Mole (kg/mol)
  Molar Mass Unit Conversion
- Measurement: **Molality** in Mole per Kilogram (mol/kg)
  Molality Unit Conversion

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