Important Formulas of Polymers PDF

Formulas
Examples
with Units

List of 11
Important Formulas of Polymers

1) Average Functionality Factor Formula

Evaluate Formula

Formula

$$f_{avg} = \frac{M \cdot f}{N_T}$$

Example with Units

$$8.75 = \frac{14\,\text{mol} \cdot 5}{8\,\text{mol}}$$

2) Compressive Strength of Material Formula

Evaluate Formula

Formula

$$CS = \frac{F_{material}}{Ar}$$

Example with Units

$$9.8E{+}8\,\text{Pa} = \frac{1960\,\text{N}}{2\,\text{mm}^2}$$

3) Contour Length of Macromolecule Formula

Evaluate Formula

Formula

$$R_c = N_{mer} \cdot l$$

Example with Units

$$3\,\text{A} = 100 \cdot 0.03\,\text{A}$$

4) Number-Average Degree of Polymerization Formula

Evaluate Formula

Formula

$$DP_N = \frac{N_o}{N}$$

Example

$$3 = \frac{9}{3}$$

5) Number-Average Molecular Weight Formula

Evaluate Formula

Formula

$$M_n = \frac{m_{repeating}}{1 - p}$$

Example with Units

$$23.3766\,\text{g/mol} = \frac{18\,\text{g}}{1 - 0.23}$$

6) Polydispersity Index for Step-Reaction Polymers Formula

Evaluate Formula

Formula

$$PDI = \frac{M_w}{M_n}$$

Example with Units

$$1.2298 = \frac{28.74\,\text{g/mol}}{23.37\,\text{g/mol}}$$

7) Rate of Polycondensation Formula

Evaluate Formula

Formula

$$R_p = k \cdot (A)^2 \cdot D$$

Example with Units

$$29.4 = 0.1\,s^{-1} \cdot (7\,mol/m^3)^2 \cdot 6\,mol/m^3$$

8) Sedimentation Coefficient of Particle Formula

Evaluate Formula

Formula

$$s = \frac{v_t}{a}$$

Example with Units

$$0.0241\,Sv = \frac{4.1\,mm/s}{1.7E\text{-}14\,m/s^2}$$

9) Tensile Strength given Cross-Sectional Area Formula

Evaluate Formula

Formula

$$TS = \frac{F_{material}}{Ar}$$

Example with Units

$$9.8E{+}8\,Pa = \frac{1960\,N}{2\,mm^2}$$

10) Viscosity Number Formula

Evaluate Formula

Formula

$$VN = \frac{\frac{t}{t_o} - 1}{c}$$

Example with Units

$$60.4961 = \frac{\frac{2000\,s}{30\,s} - 1}{1.14\,g/mL}$$

11) Weight-Average Molecular Weight in General Step Reaction Polymerization Formula

Evaluate Formula

Formula

$$M_w = M_n \cdot (1 + p)$$

Example with Units

$$28.7451\,g/mol = 23.37\,g/mol \cdot (1 + 0.23)$$

Variables used in list of Important Formulas of Polymers above

- **a** Applied Acceleration *(Meter per Square Second)*
- **A** Diacid Concentration *(Mole per Cubic Meter)*
- **Ar** Cross Sectional Area of Polymer *(Square Millimeter)*
- **c** Polymer Concentration *(Gram per Milliliter)*
- **CS** Compressive Strength of Material *(Pascal)*
- **D** Diol Concentration *(Mole per Cubic Meter)*
- DP_N Number-Average Degree of Polymerization
- **f** Functionality
- f_{avg} Average Functional Factor
- $F_{material}$ Force Applied on Material *(Newton)*
- **k** Rate Constant *(1 Per Second)*
- **l** Length of Monomer Unit *(Angstrom)*
- **M** Mole of each Reactant *(Mole)*
- M_n Number-Average Molecular Weight *(Gram Per Mole)*
- $m_{repeating}$ Molecular Weight of Repeating Unit *(Gram)*
- M_w Weight-Average Molecular Weight *(Gram Per Mole)*
- **N** Number of Molecules at Specific Time
- N_{mer} Number of Monomers
- N_o Number of Original Molecules
- N_T Total Number of Moles *(Mole)*
- **p** Probability of Finding Repeating Unit AB
- **PDI** Polydispersity Index
- R_c Contour Length *(Angstrom)*
- R_p Rate of Polycondensation
- **s** Sedimentation Coefficient *(Svedberg)*
- **t** Flow Time of Polymer Solution *(Second)*
- t_o Flow Time of Solvent *(Second)*
- **TS** Tensile Strength *(Pascal)*
- v_t Sedimentation Speed *(Millimeter per Second)*
- **VN** Viscosity Number

Constants, Functions, Measurements used in list of Important Formulas of Polymers above

- Measurement: **Length** in Angstrom (A)
  Length Unit Conversion
- Measurement: **Weight** in Gram (g)
  Weight Unit Conversion
- Measurement: **Time** in Svedberg (Sv), Second (s)
  Time Unit Conversion
- Measurement: **Amount of Substance** in Mole (mol)
  Amount of Substance Unit Conversion
- Measurement: **Area** in Square Millimeter (mm^2)
  Area Unit Conversion
- Measurement: **Pressure** in Pascal (Pa)
  Pressure Unit Conversion
- Measurement: **Speed** in Millimeter per Second (mm/s)
  Speed Unit Conversion
- Measurement: **Acceleration** in Meter per Square Second (m/s^2)
  Acceleration Unit Conversion
- Measurement: **Force** in Newton (N)
  Force Unit Conversion
- Measurement: **Molar Concentration** in Mole per Cubic Meter (mol/m^3)
  Molar Concentration Unit Conversion
- Measurement: **Density** in Gram per Milliliter (g/mL)
  Density Unit Conversion
- Measurement: **Molar Mass** in Gram Per Mole (g/mol)
  Molar Mass Unit Conversion
- Measurement: **First Order Reaction Rate Constant** in 1 Per Second (s^{-1})
  First Order Reaction Rate Constant Unit Conversion

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