

degree of crystallinity

of a polymer

The fractional amount of crystallinity in the polymer sample (w_c for mass fraction; φ_c for volume fraction).

Notes:

1. The assumption is made that the sample can be subdivided into a crystalline phase and an amorphous phase (the so-called two-phase model).
2. Both phases are assumed to have properties identical with those of their ideal states, with no influence of interfaces.
3. The degree of crystallinity may be expressed either as the mass fraction or as the volume fraction, the two quantities being related by $w_c = \frac{\varphi_c \rho_c}{\rho}$ where ρ and ρ_c are the densities of the entire sample and of the crystalline fraction, respectively.
4. The degree of crystallinity can be determined by several experimental techniques; among the most commonly used are: (i) X-ray diffraction, (ii) calorimetry, (iii) density measurements, and (iv) infrared spectroscopy (IR). Imperfections in crystals are not easily distinguished from the amorphous phase. Also, the various techniques may be affected to different extents by imperfections and interfacial effects. Hence, some disagreement among the results of quantitative measurements of crystallinity by different methods is frequently encountered.

Source:

Purple Book, p. 75