Questions 1 to 4 are based on the following information:

A polymer sample consists of three fractions of different-sized molecules (i.e., chains) having molar masses of 30,000 g/mol, 40,000 g/mol and 50,000 g/mol. The number of moles of the respective fractions in the sample are 0.025, 0.020 and 0.005 respectively (i.e., 0.025 moles of the 30,000 g/mol fraction etc.).

1. The number-average molar mass is _______ g/mol.

No, the answer is incorrect.
Score: 0
Accepted Answers:
*(Type: Numeric) 36000*

2) The polydispersity index, up to three decimal places, is _______.

No, the answer is incorrect.
Score: 0
Accepted Answers:
*(Type: Range) 1.033-1.035*
4) The weight fraction of the molecules having molar mass of 40,000 g/mol, up to two decimal places, is _______.

No, the answer is incorrect.
Score: 0
Accepted Answers: 36970

5) A random copolymer consists of the following two repeat units in the ratio 6:4 by weight:

\[ \text{CO} - (\text{CH}_2)_6 - \text{NH} \quad (60\text{wt}\%) \quad \text{C} - \text{O} \quad \text{NH} \quad (40\text{wt}\%) \]

that the number-average molar mass of the copolymer is 50,000 g mol\(^{-1}\), the number-average degree of polymerization of the copolymer, rounded off to the nearest integer, is _______.

No, the answer is incorrect.
Score: 0
Accepted Answers: (Type: Range) 400-410

6) Which of the following polymers can exhibit geometrical or cis-trans isomerism:

- Polyethylene
- Polypropylene
- Polystyrene
- Polyisoprene

No, the answer is incorrect.
Score: 0
Accepted Answers: Polyisoprene

7) The characteristic ratio \( C_\infty \) for freely rotating polymer chains having an angle of 70° between adjacent bond vectors, up to two decimal places, is _______.

No, the answer is incorrect.
Score: 0
Accepted Answers:
Questions 8 to 10 are based on the following information:

Consider ideal linear polymer molecules containing 5000 backbone bonds. The bond length is 1.54 Å and the angle between adjacent bond vectors in 70.5°. Assume that the polymer chains are described by the freely rotating mode.

The mean-square radius of gyration, rounded off to the nearest integer, is ______ Å².

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 3940-3970

The maximum end-to-end distance ($R_{max}$), rounded off to the nearest integer, is ______ Å.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 6200-6350

The Kuhn length, up to two decimal places, is ______ Å.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 3.70-3.85

At the most probable end-to-end distance ($r_{mp}$), the distribution function of end-to-end distances shows a maximum. Assuming the magnitude of the end-to-end vector to be much smaller than the contour length, $r_{mp}$ for an ideal freely jointed chain is given by

- $(r_{mp})^2 = \frac{2n}{3} l^2$
- $(r_{mp})^2 = \frac{nl^2}{2}$
- $(r_{mp})^2 = nl^2$
- $(r_{mp})^2 = 3nl^2/4$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$(r_{mp})^2 = \frac{2n}{3} l^2$

Assume that the unperturbed dimensions of the polystyrene chains can be represented using the hindered rotation model. Take the carbon-
carbon bond length to be 1.54 Å, the angle between bond vectors to be 70.5° and \( \langle \cos \phi \rangle \) to be 0.65. If the expansion parameter (\( \alpha_r \)) for polystyrene in a solution is 2.5, the root mean square end-to-end distance (\( \langle R^2 \rangle^{1/2} \)) of polystyrene having 10,000 backbone C-C bonds in the solution is

- 783 Å
- 983 Å
- 1183 Å
- 1383 Å

No, the answer is incorrect.
Score: 0
Accepted Answers: 1183 Å