1. For each of the following polymers, draw the 3-D structure of all stereoisomers that would exhibit true optical activity.

\[
\left(\text{CH}_2 - \text{CH} = \text{CH} - \text{CH}_2\right)_x
\]

2. Calculate the number average molecular weight (\(\overline{M}_n\)), weight average molecular weight (\(\overline{M}_w\)) and polydispersity index (PDI) of a polymer sample created by mixing 1 mole of a 50,000 g/mole polymer chain with 1 mole of a 150,000 g/mole polymer chain. Assume both polymers to be monodisperse.

3. Show the structure of a tripeptide that would....

a. adsorb onto a positively charged surface at pH > 10 and adsorb onto a negatively charged surface over the pH range of 2.0-6.0.

b. form inter-molecular covalent crosslinks

c. be a building block of a \(\alpha\)-helix

4. An analysis of a meteor that impacted the earth reveals the presence of both D and L amino acid optical isomers. Speculate as to whether or not this meteor came from a planet that supported life and explain the basis for your speculation.