

Polymer Science

Chapter 2,

In emulsion polymerization, the principal place where the monomer polymerizes is

- a) monomer droplets
- b) aqueous phase
- c) swollen surfactant micelles
- d) surface of reactor

solution :- given that

(9) In emulsion polymerization, the monomer polymerizes in "aqueous phase".

∴ The correct option is

(b) Aqueous Phase

As per chegg rule I am answering 1st question
If you have any doubts please comment below

4) . If a polymer chain has a molecular weight of 280,000, how many ethylene units does it contain?

There are 2 Carbon and 4 Hydrogen in one ethylene molecule
 So Molecular mass of one ethylene = $2 \times 12 + 4 \times 1$
 $= 24 + 4 = 28 \text{ g/mol}$

Molecular weight / mass of 200 mer chain polymer = 200×28
 $= \boxed{5600 \text{ g/mol}}$ Ans

Another chain has Molecular weight of 420,000 g/mol
 Degree of Polymerization (DP) = $\frac{\text{Molecular weight of Polymer}}{\text{Mer Molecular weight}}$

$DP = \frac{420,000}{28} = 15000$

$\boxed{DP = 15000}$ Ans

17) Which of the following polymers is least likely to be optically transparent?

- a) atactic polystyrene
- b) isotactic polystyrene
- c) an ethylene/propylene random copolymer
- d) a styrene/butadiene random copolymer

Option B

It is prepared by sintering and hot isostatic pressing. It has the glass transition temperature greater than 100°C .

20. High pressure, high temperature free-radical polymerization of ethylene produces

- a) HDPE b) LDPE c) PP d) LLDPE

Answer is : LDPE

Calculate the molecular weights of the repeating units of polypropylene and PVC. Determine Mw for a polypropylene of average degree of polymerisation of 18,000. (Atomic masses of H = 1, C = 12, and Cl = 35). Answer: $m(\text{PP}) = 42 \text{ g/mol}$; $m(\text{PVC}) = 62.5 \text{ g/mol}$; $w = 756 \times 10^3 \text{ g/mol}$

Similar answer

$$\begin{aligned} \therefore \text{molecular weight} &= 3 \times \text{molecular wt. of carbon} \\ &\quad + 6 \times \text{molecular wt. of hydrogen} \\ &= 3 \times 12 + 6 \times 1 = 42 \text{ g/mol} \end{aligned}$$

$$\begin{aligned} \text{Number average molecular weight} \\ &= (\text{Degree of polymerization}) \times \text{molecular weight} \\ &= 18,000 \times 42 = 630,000 \text{ g/mol} \end{aligned}$$

2) for PVC each repeat unit has two carbons, three hydrogen and one chlorine.

$$\begin{aligned} \therefore \text{molecular weight} &= 2 \times 12 + 3 \times 1 + 1 \times 35.5 \\ &= 62.5 \text{ g/mol} \end{aligned}$$

$$\therefore \text{Degree of polymerization} = \frac{187500}{62.5} = 3000$$

1) for polypropylene each repeat unit has three carbons and six hydrogens.

$$\begin{aligned} \therefore \text{molecular weight} &= 3 \times \text{molecular wt. of carbon} \\ &\quad + 6 \times \text{molecular wt. of hydrogen} \\ &= 3 \times 12 + 6 \times 1 = 42 \text{ g/mol} \end{aligned}$$

$$\begin{aligned} \text{Number average molecular weight} \\ &= (\text{Degree of polymerization}) \times \text{molecular weight} \\ &= 18,000 \times 42 = 630,000 \text{ g/mol} \end{aligned}$$

2) for PVC each repeat unit has two carbons, three hydrogen and one chlorine.

The molecules of a sample of polystyrene can be divided into 5 groups in terms of their molecular weight with the same number of molecules in each group. The molecular weights of the molecules in the groups are 10,000; 20,000; 30,000; 40,000; 50,000. Calculate \bar{n} . Answer: $\bar{n} = 30,000$.

Solution :

Group	No. of molecules	Molecular weight (g/mole)
1	1	50,000
2	4	100,000
3	5	200,000
4	3	500,000
5	1	700,000

Molecular wt. of a polymer

$$\begin{aligned}
 & 1 \times 50,000 + 4 \times 100,000 + 5 \times 200,000 + 3 \times 500,000 \\
 & \quad + 1 \times 700,000 \\
 = & \frac{\quad}{(1+4+5+3+1)} \\
 = & \frac{50,000 + 400,000 + 10,00,000 + 15,00,000 + 700,000}{14} \\
 = & \frac{36,50,000}{14} \\
 = & 260714.28 \text{ g/mole. } \underline{\text{Ans}}
 \end{aligned}$$