



FORCES BETWEEN POLYMER CHAINS

	Addition	Condensation	
		polyesters	polyamides
Strongest forces between polymer chains	Van der Waals' forces (some may have hydrogen bonds / permanent dipole-dipole if they contain appropriate groups on the C atoms in the chain)	Permanent dipole-dipole forces (due to polar C=O bonds)	Hydrogen bonds (due to polar presence of N-H bonds within molecules)
Examples	poly(ethene) $\left[\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ -\text{C}-\text{C}- \\ \quad \\ \text{H} \quad \text{H} \end{array} \right]_n$	terylene (PET) $\left[\text{C}(=\text{O})-\text{C}_6\text{H}_4-\text{C}(=\text{O})-\text{O}-\text{CH}_2-\text{CH}_2-\text{O} \right]_n$	nylon-6,6 $\left[\text{C}(=\text{O})-(\text{CH}_2)_4-\text{C}(=\text{O})-\text{NH}-(\text{CH}_2)_6-\text{NH} \right]_n$

	Polymer structure	Strongest force between polymer chains		
		Van der Waals' forces	Permanent dipole-dipole forces	Hydrogen bonds
1	$\left[\begin{array}{c} \text{H} \quad \text{CH}_3 \\ \quad \\ -\text{C}-\text{C}- \\ \quad \\ \text{H} \quad \text{H} \end{array} \right]_n$	✓		
2	$\left[\text{C}(=\text{O})-\text{C}_6\text{H}_4-\text{C}(=\text{O})-\text{NH}-\text{C}_6\text{H}_4-\text{NH} \right]_n$			✓
3	$\left[\text{NH}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{C}(=\text{O}) \right]_n$			✓
4	$\left[\begin{array}{c} \text{H} \quad \text{OH} \\ \quad \\ -\text{C}-\text{C}- \\ \quad \\ \text{H} \quad \text{H} \end{array} \right]_n$			✓
5	$\left[\text{C}(=\text{O})-\text{C}_6\text{H}_4-\text{C}(=\text{O})-\text{O}-\text{CH}_2-\text{CH}_2-\text{O} \right]_n$		✓	
6	$\left[\begin{array}{c} \text{H} \quad \text{Cl} \\ \quad \\ -\text{C}-\text{C}- \\ \quad \\ \text{H} \quad \text{H} \end{array} \right]_n$		✓	
7	$\left[\text{C}(=\text{O})-(\text{CH}_2)_4-\text{C}(=\text{O})-\text{N}(\text{CH}_3)-(\text{CH}_2)_4-\text{N}(\text{CH}_3) \right]_n$		✓	