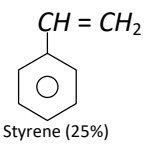
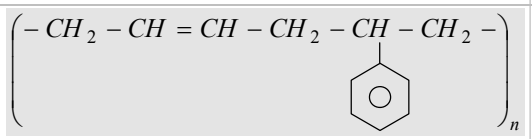
Some important polymer and their uses.

(1) Rubber: Are as under all are addition polymer.

Rubber	Monomers	Formula	Application
(i) Neoprene rubber	$CH_2=\underset{Cl}{C}-CH=CH_2$ Chloropren e	$\left(-CH_2-\underset{Cl}{C}=CH-CH_2-\right)_n$	Making automobile, refrigerator parts and electric wire.
(ii) Styrene Butadiene Rubber (SBR) or Buna-S	$CH_2=CH-CH=CH_2$ Butadiene (75%) and  Styrene (25%)		Making of tyre and other mechanical rubber goods.
(iii) Butyl rubber	$CH_2=\underset{CH_3}{\overset{CH_3}{C}}$ Isobutylen e (98 %) and $CH_2=\underset{CH_3}{C}-CH=CH_2$ Isoprene (2-3 %)	$\left(-CH_2-\underset{CH_3}{\overset{CH_3}{C}}=CH-CH_2-\underset{CH_3}{\overset{CH_3}{C}}-CH_2-\right)_n$	Making of toys, tyre, tube etc.
(iv) Nitrile rubber or Buna N or GRA	$CH_2=CH-CH=CH_2$ Butadiene (75%) and $CH_2=CH-CN$ Acrylonitrile (25%)	$\left(-CH_2-\underset{CN}{CH}-CH_2-CH=CH-CH_2-\right)_n$	Used for make of fuel tank.
(v) Polysulphide rubber (Thiokol)	$Cl-CH_2-CH_2-Cl$ Ethylene dichloride and Na_2S_4 Sodium polysulph ide	$(-CH_2-CH_2-S-S-S-S-)_n$	Used in the manufacture of hoses and tank lining, engine gasket and rocket fuel.
(vi) Silicone rubber	$Cl-\underset{Cl}{\overset{CH_3}{Si}}-CH_3$ Chlorosila nes	$\left(-O-\underset{CH_3}{\overset{CH_3}{Si}}-\right)_n$	Silicon rubber
(vii) Polyuretha ne rubber	$HOCH_2-CH_2OH$ Ethylene glycol		In the manufacture of fibre.

	and $\underset{\text{Ethylene di-isocyanate}}{O=C=N-CH=CH-N=C=O}$		Paints and heat insulator.

(2) Plastics and resin

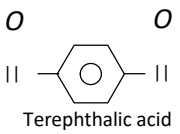
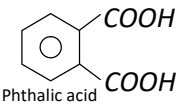
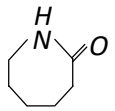
Name of polymer	Abbreviat-ion	Starting materials	Nature of polymer	Properties	Applications
(i) Polyolefines					
(a) Polyethylene or polyethene	HDPE (High density polyethene)	$CH_2=CH_2$	Low density homopolymer (branched) chain growth.	Transparent, moderate tensile strength, high toughness.	Packing material carry bags, insulation for electrical wires and cables. Buckets, tubs, house ware, pipes, bottles and toys.
	LDPE (Low density polyethene)	$CH_2=CH_2$	High density homopolymer (linear) chain growth.	Transluscent, chemically inert, greater tensile strength, toughness.	
(b) Polypropylene or polypropene	PP	$CH_3CH=CH_2$	Homopolymer, linear, chain growth.	Harder and stronger than polyethene.	Packing of textiles and foods, liners for bags, heat shrinkage wraps, carpet fibres, ropes, automobile mouldings, stronger pipes and bottles.
(c) Polystyrene or Styron		$C_6H_5CH=CH_2$	Homopolymer, linear, chain growth	Transparent	Plastic toys, house hold wares, radio and television bodies, refrigerator

					linings.
(ii) Polyhaloolefines					
(a) Polyvinyl chloride	PVC	$CH_2 = CH - Cl$ Vinyl chloride	Homopolymer chains growth	Thermoplastic	(i) Plasticised with high boiling esters PVC used in rain coats, hand bags, shower curtains, fabrics, shoe soles, vinyl flooring (ii) Good electrical insulator (iii) Hose pipes.
(b) Polytetrafluoroet-hylene or Teflon	PTFE	$F_2C = CF_2$	Homopolymer, high melting point	Flexible and inert to solvents boiling acids even aqua regia. Stable upto 598 K.	(i) For nonstick utensiles coating (ii) Making gaskets, pump packings valves, seals, non lubricated bearings.
(c) Polymonochlorotri-fluroroethylene	PCTFE	$ClFC = CF_2$	Homopolymer	Less resistant to heat and chemicals due to presence of chlorine atoms.	Similar to those of teflon.
(iii) Formaladehyde resins					
(a) Phenol formaldehyde resin or Bakelite		Phenol and formaldehyde	Copolymer, step growth	Thermosetting polymer, hard and brittle	(i) With low degree polymerisation as bindings glue for wood varnishes,

					lacquers. (ii) With high degree polymerisation for combs, for mica table tops, fountain pen barrels electrical goods (switches and plugs).
(b) Melamine formaldehyde resin		Melamine and formaldehyde	Copolymer, step growth	Thermosetting polymer, hard but not so breakable.	Non-breakable crockery.
(iv) Polyacrylates					
(a) Polymethacrylate (lucite, acrylite and plexiglass and perspex)	PMMA	$CH_2 = \overset{CH_3}{\overset{\vert}{C}} - COOCH_3$	Copolymer	Hard transparent, excellent light transmission, optical clarity better than glass takes up colours.	Lenses light covers lights, shades signboards transparent domes skylight aircraft window, dentures and plastic jewellery.
(b) Polyethylacrylate		$CH_2 = CH - COOC_2H_5$	Copolymer	Tough, rubber like product	

(3) Fibre

(i) Polysters					

(a) Terylene or Dacron	PET (Polyethylene terephthalate)	$HO-CH_2-CH_2-OH$ Ethylene glycol or Ethane -1, 2- diol and  Terephthalic acid	Copolymer, step growth linear condensation polymer	Fibre crease resistant, low moisture absorption, not damaged by pests like moths etc.	For wash and wear fabrics, tyre cords seat belts and salts.
(b) Glyptal or alkyl resin		$HO-CH_2-CH_2-OH$ Ethylene glycol and  Phthalic acid	Copolymer, linear step growth condensation polymer	Thermoplastic, dissolves in suitable solvents and solutions on evaporation leaves a tough but not flexible film.	Paints and lacqures.
(ii) Polyamides					
(a) Nylon-66		$HO-\overset{O}{\overset{\|\|}{C}}[CH_2]_4\overset{O}{\overset{\|\|}{C}}-OH$ Adipic acid and $H_2N-[CH_2]_6-NH_2$ Hexamethyl lenediamin e	Copolymer, linear, step growth condensation polymer	Thermoplastic high tensile strength abrasion resistant.	Textile fabrics, bristles for brushes etc.
(b) Nylon-610		$H_2N-[CH_2]_6-NH_2$ Hexamethyl lene diamine and $HOOC[CH_2]_8COOH$ Sebacic acid	Copolymer, linear, step growth	Thermoplastic, high tensile strength, abrasion resistant	(i) Textile fabrics, carpets, bristles for brushes etc. (ii) Substitute of metals in bearings. (iii) Gears elastic hosiery.
(c) Nylon-6 or Perlon		 Caprolactum or $H_2N-[CH_2]_5-COOH$	Homopolymer, linear	Thermoplastic high tensile strength abraison resistant.	Mountaineering ropes, tyre cords, fabrics.

(iii) Polyacryloni-trile or orlon or acrilon	PAN	$CH_2 = CH - CN$	Copolymer	Hard, horney and high melting materials.	Orlon, acrilon used for making clothes, carpets blankets and preparation of other polymers.

Note: Copolymer of acrylonitrile (40%) and vinyl chloride (60%) is called dynel it is used in hair wigs. Artificial silk is the term given to fibres derived from cellulose. The most important process for the production of artificial silk is viscose process. The difference between natural and artificial silk is natural silk contain nitrogen while artificial silk may not have nitrogen. Natural silk on burning gives a smell of burning hair and shrinks into a ball of cinder while artificial silk gives a thread of ash.