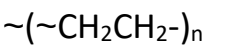
Nomenclature

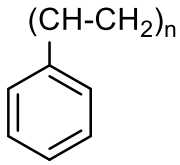
There are many methods for naming the polymers. The methods based on either the structure of the polymer or the source or trade name.

Nomenclature based on source:

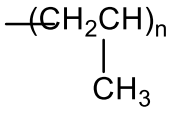
This system is applicable for polymers synthesized from single monomer. The polymers are named by adding the name of the monomer onto "Poly" without space.



Polyethylene

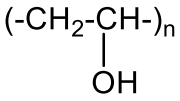


Polystyrene

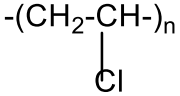


Polypropylene

When the monomer has a substituent, the name of the monomer is put in between brackets after the word poly.

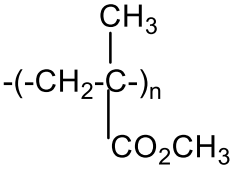


Poly(vinyl alchohol)

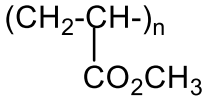


Poly(vinyle chloride)

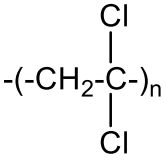
Poly(ehylene oxide)



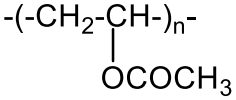
Poly(methyl methaacrylate)



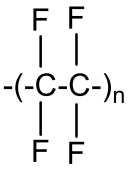
Poly(methyl acrylate)



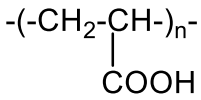
Poly(vinylidine chloride)



Poly(vinyl acetate)

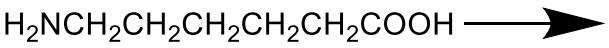


Poly(tetrafloro ethylene)



Poly(acrylic acid

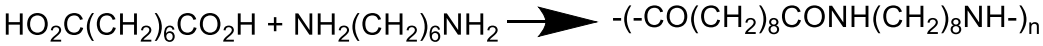
The condensation polymers formed from single reactants are named in a similar manner.



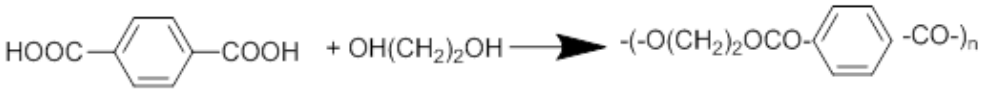
Poly(6-aminocaproic acid)

Nomenclature based on structure (Non-IUPAC):

This system is used for condensation polymers synthesized from two different monomers. The name is obtained by following poly without space with brackets enclosing the name of the structural group attached to the parent compound.



sebasic acid hexamethylene diamine Poly(hexamethylene sebacamide)
polyamide



terephthalic acid ethylene glygol poly(ethylene terephthalate)

trimethylene glygol ethylene diisocyanate

poly(trimethylene ethyleneurethane)

IUPAC structure –Based nomenclature system:

This system is used for single – strand organic polymer. The basic of this system is the selection of the constitutional repeating unit (CRU).

The CRU is the structural repeating unit , it was the smallest possible repeating unit within the backbone of the polymer. The name of the polymer is the name of CRU in brackets prefixed by "poly ". the CRU is named according to IUPAC nomenclature rules for small compounds. The rules for naming the type of polymers is as following:

1-The name is poly followed by bracket contain the name of CRU which is named by its subunits, which is the largest subunit that can be named by IUPAC system.

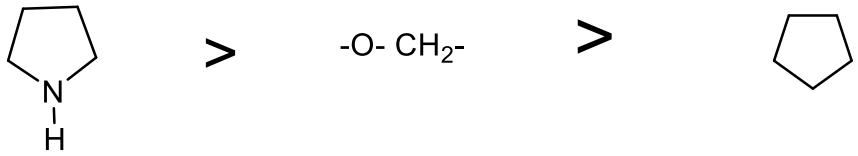
2- CRU is written from left to right starting from highest seniority.

3- The seniority of the moieties (subunits) of different types is:

Heterocyclic rings > acyclic unit with hetero atoms > carbocylic ring > acyclic with carbon only

(greatest number of multiple bond> lowest locant to substituents >Chains with only carbon atoms

heterocyclic > acyclic hetero atom > carbocyclic ring



Multiple bonds > Lowest locant > Only carbon chains
-CH=CH- > -CF2-CHF > -CHF-CF2- > -CH2-CH2-

For ring systems the overall seniority is: **Heterocyclic > Carbocyclic**

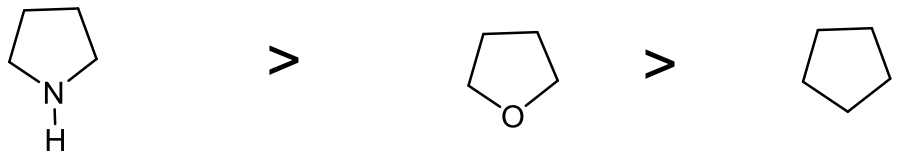
4- The seniority of heterocyclic ring is:

Ring with nitrogen atom > other heteroatoms ring with order in rule 5 > ring having the greatest number of hetero atoms > largest ring.

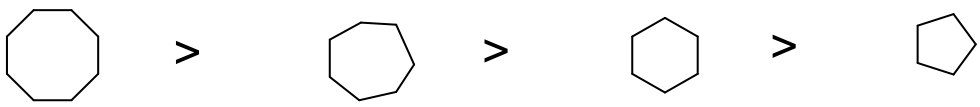
5- the seniority of hetero atoms is :

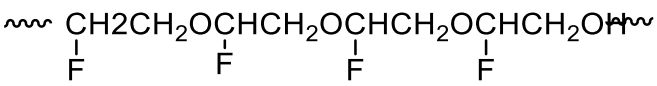
Se > Te > P > As > Sb > Bi > Si > Ge > Sn > Pb > B > Hg > O > S

nitogen conaining heterocyclic > heterocyclic > carbocyclic

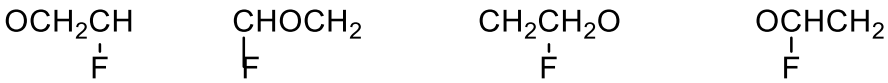


8- membered ring > 7-membered ring > 6-membered ring > 6-membered ring



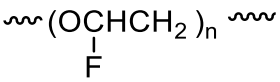


The possible CRUs can be:



I II III IV

The O atom have the higher seniority than C, so CEU I and IV are chose. Fluorine have lower location in IV than in I, so that IV is suitable CRU for naming and the chemical formula of the polymer is

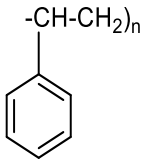
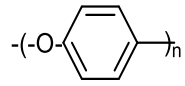
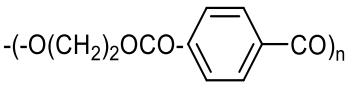
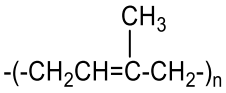


Poly(oxy(1-fluoroethylene))

While if I is chose (not right) the name is : poly(oxy(2-fluoroethylene)).

<u>Commercial name (common name):</u>

There are many commercial polymers have name based on source as a semi systematic names. These names can be established only for common polymers as in the table below:

polymer	commen name	IUPAC
$-(CH_2CH_2-)_n-$	polyethylene	polymethylene
$-(-CH(CH_3)-CH_2)_n$	polypropylene or polypropene	poly(1-methyl ethylene)
	polystyrene	poly(1- phenylethylene)
$-(-CH(COOCH_3)-CH_2)_n$	poly(methyl acrylate)	poly(1-(methoxy carbonyl ethylene)
$-(-OCH_2)_n$	polyformaldehyde	poly(oxy methylene)
	poly(phenylene oxide)	poly(oxy-1,4-phenylene)
	poly(ethylene terephthalete	poly(oxyethylene oxyterephthalete)
$-(-HN(CH_2)_6NHCO(CH_2)_8CO-)_n$	poly(hexamethylene adipamide)	poly(amidohexamethylene amido octamethylene)
$-(-CH_2-CH=CH-CH_2-)_n$	polybutadiene	poly(butylene-2-ene)
	polyisoprene	poly(butylene-2-ene-2-methyl)

Trade name:

Special trade name has been employed for some polymers. The trade name of polyamide is nylon. Two numbers are added onto the word nylon, the first number indicate the number of methylene groups of diamine portion and the second number is the number of carbon atoms in the diacyl portion.

Poly(hexamethylene adipamide) nylon 66

-)-$NH(CH_2)_6NHCO(CH_2)_4CO$-)n

Poly(hexamethylene sebacamide) nylon 610

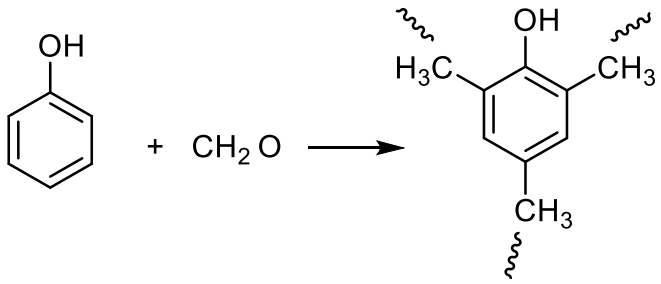
$NH(CH_2)_6NHCO(CH_2)_8CO-)_n$

If the polyamide is from single monomer, it was denoted by

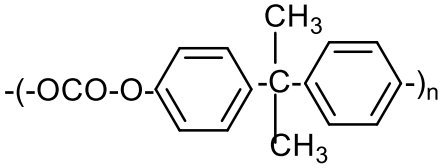
A single number of carbon atoms in the repeating unit ; i.g.

Poly(6-aminocaproic acid) nylon 6 $-(-NHCO(CH_2)_5-)_n$

Many polymers seem not to have name , for example the condensation polymers of phenol with formaldehyde



Called phenol- formaldehyde polymer or phenolic resin or phenoplast.



The IUPAC name of this polymer is

Poly(oxycarbonyl oxy-1,4-phenylene dimethyl methylene-1,4-phenylene)

The trade name is : polycarbonate of Bisphenol A or polycarbonate.