

CA State Standards

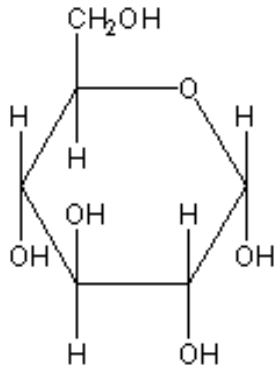
- Students know large molecules (polymers), such as proteins, nucleic acids, and starch, are formed by repetitive combinations of simple subunits.
- Students know amino acids are the building blocks of proteins.
- Students know the bonding characteristics of carbon that result in the formation of a large variety of structures ranging from simple hydrocarbons to complex polymers and biological molecules.

Definitions

Monomer - A molecule that can combine with others of the same kind to form a polymer.

Polymer - A substance that has a molecular structure built from a large number of similar units (monomers) bonded together.

Carbohydrates

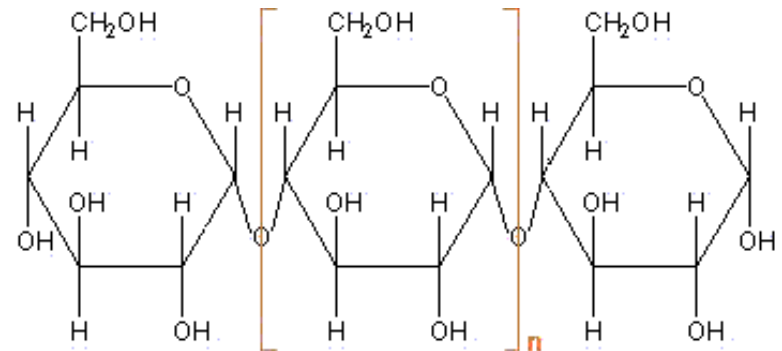


Monomer - The simple sugars

- Glucose, sucrose, fructose (and many others)

Polymer - The complex carbohydrates.

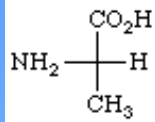
- Starch and Cellulose are long chains of simple sugars



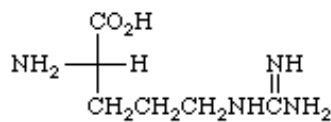
Proteins

monomer - Amino acids

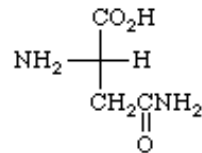
There are twenty amino acids that can be used to build human proteins



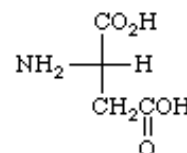
Alanine



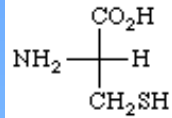
Arginine



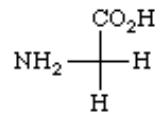
Asparagine



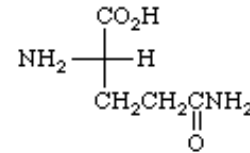
Aspartic Acid



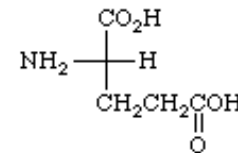
Cysteine



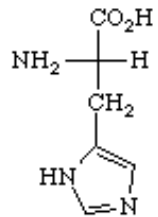
Glycine



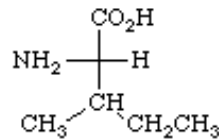
Glutamine



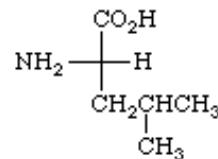
Glutamic Acid



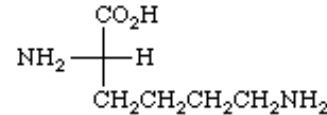
Histidine



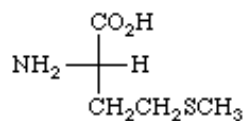
Isoleucine



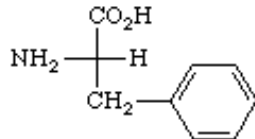
Leucine



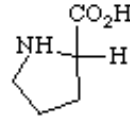
Lysine



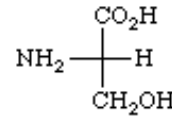
Methionine



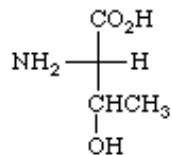
Phenylalanine



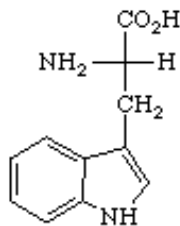
Proline



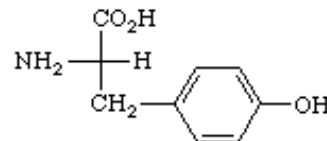
Serine



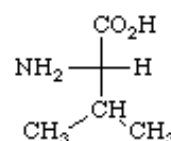
Threonine



Tryptophan

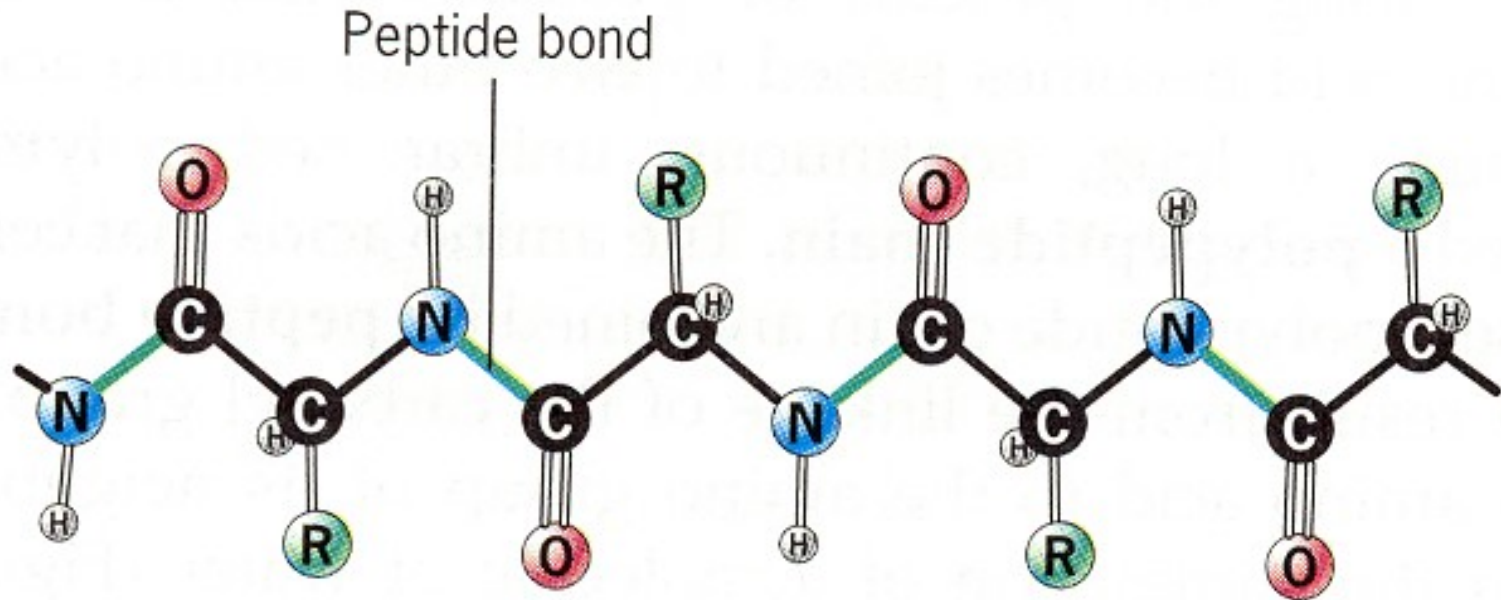


Tyrosine



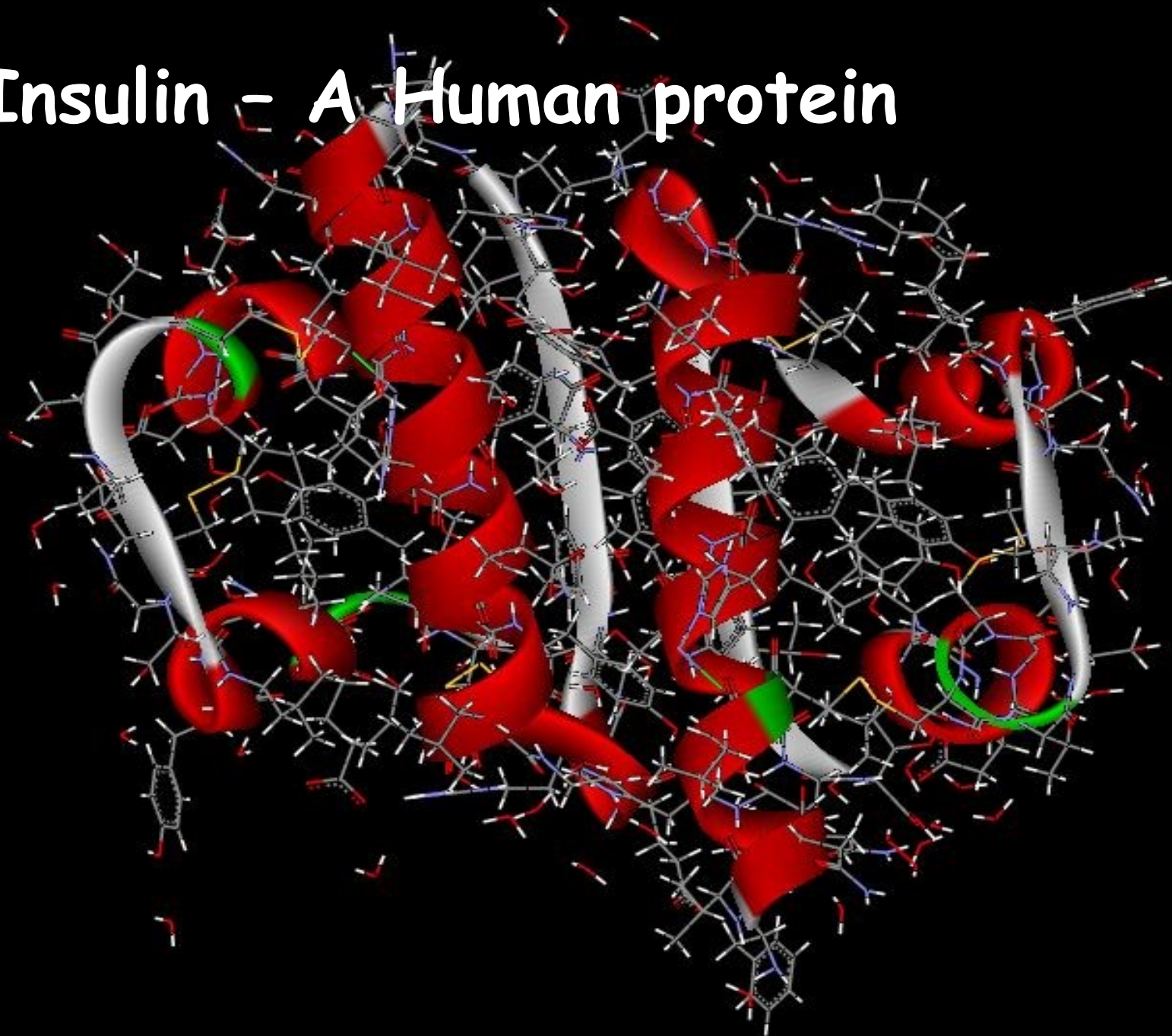
Valine

Proteins

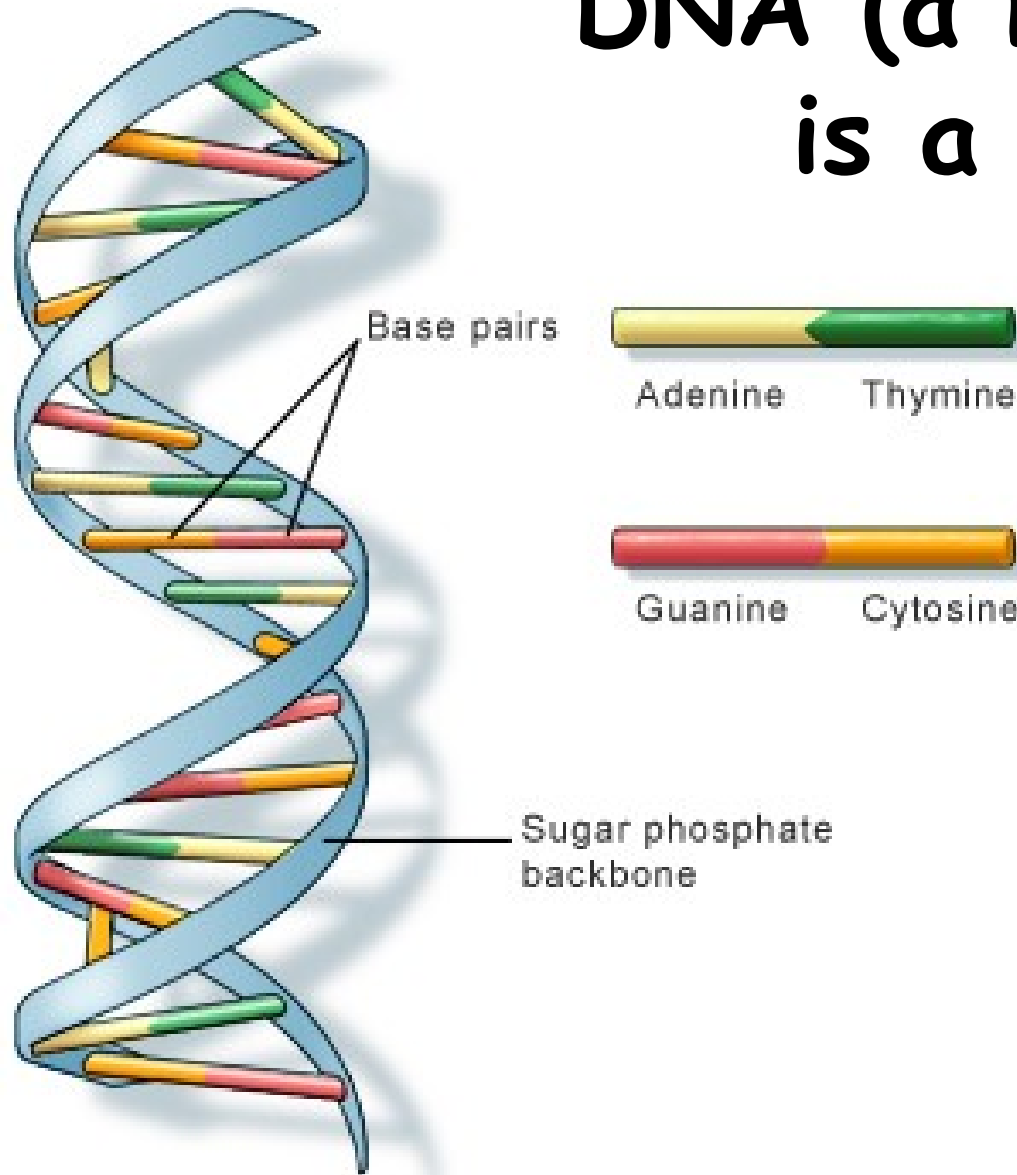


Polymer - When many amino acids bond together to create long chains, the polymer is called a protein (it is also called a polypeptide because it contains many peptide bonds).

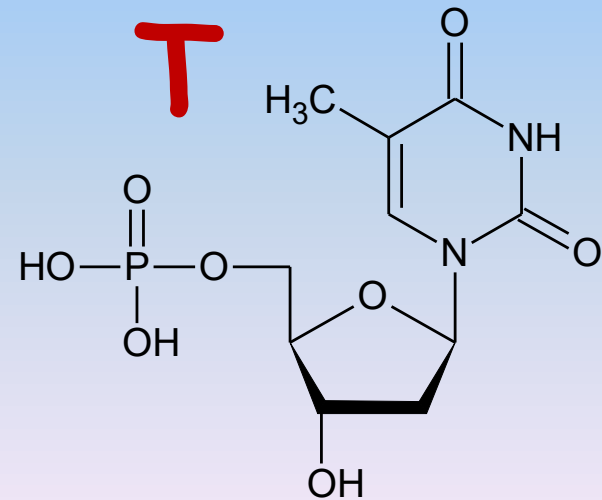
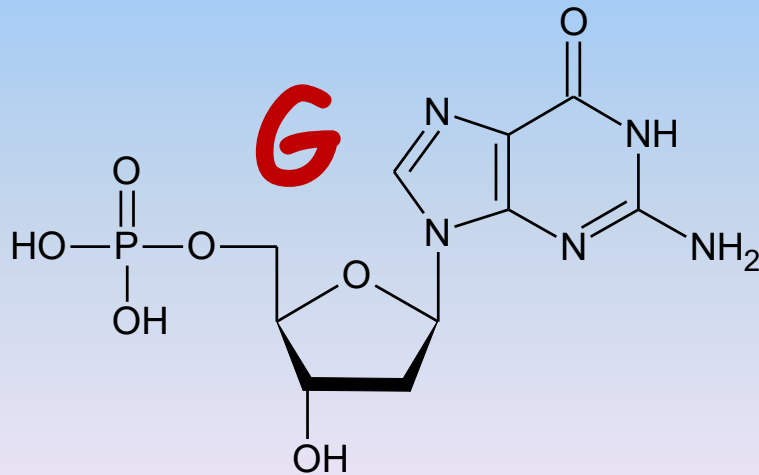
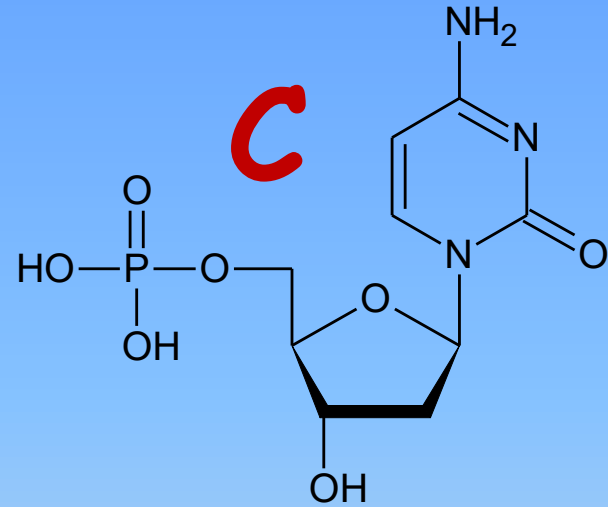
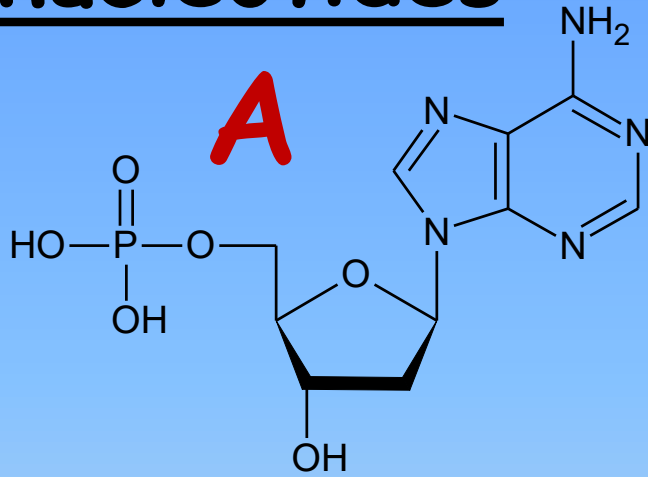
Insulin - A Human protein



DNA (a nucleic acid) is a polymer

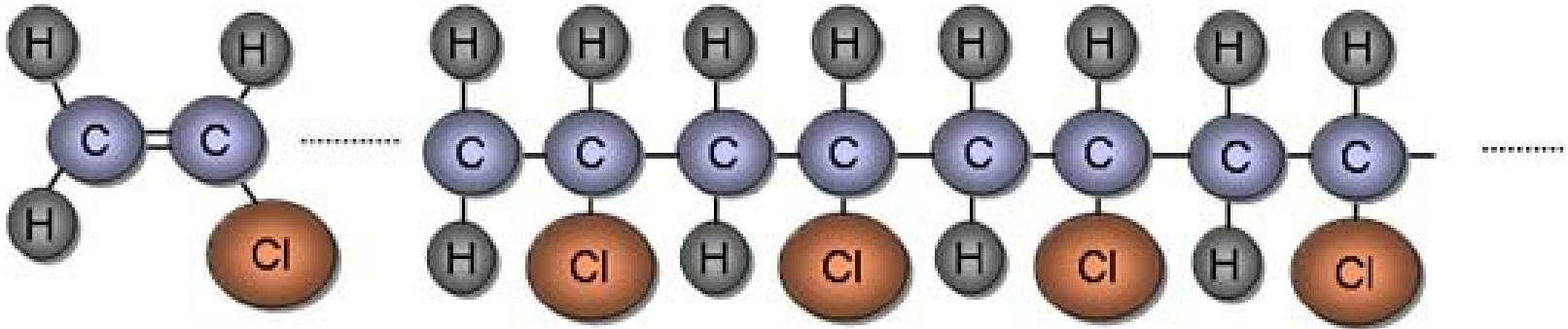


DNA is made of monomers called nucleotides



Plastics

Plastics are synthetic polymers



Monomer:

Vinyl
chloride
 C_2H_3Cl

Polymer:

Polyvinyl chloride (PVC)
..... $[C_2H_3Cl]_n$

Synthetic Polymers and Their Uses



PET Polyethylene Terephthalate

Two-liter beverage bottles, mouthwash bottles, boil-in-bag pouches.



HDPE High Density Polyethylene

Milk jugs, trash bags, detergent bottles.



PVC Polyvinyl Chloride

Cooking oil bottles, packaging around meat.



LDPE Low Density Polyethylene

Grocery bags, produce bags, food wrap, bread bags.



PP Polypropylene

Yogurt containers, shampoo bottles, straws, margarine tubs, diapers.



PS Polystyrene

Hot beverage cups, take-home boxes, egg cartons, meat trays, cd cases.