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# Biodegradable Polymers

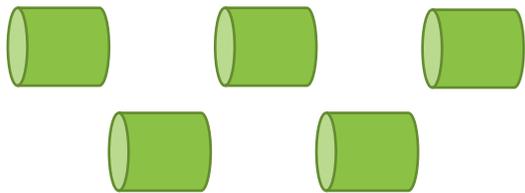
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# Polymer

- Any of a class of natural or synthetic substances composed of very large molecules, called macromolecules, that are multiples of simpler chemical units called monomers.  
(Britannica.com)



Monomers



Polymer/macromolecule



# Polymer

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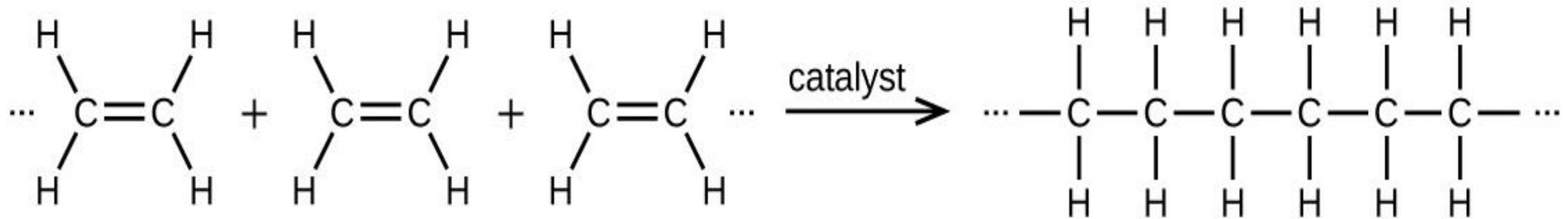
- Cellulose
- Protein
- Starch



- Polyethylene (PET)
- Polystyrene
- Polyester



# Plastics

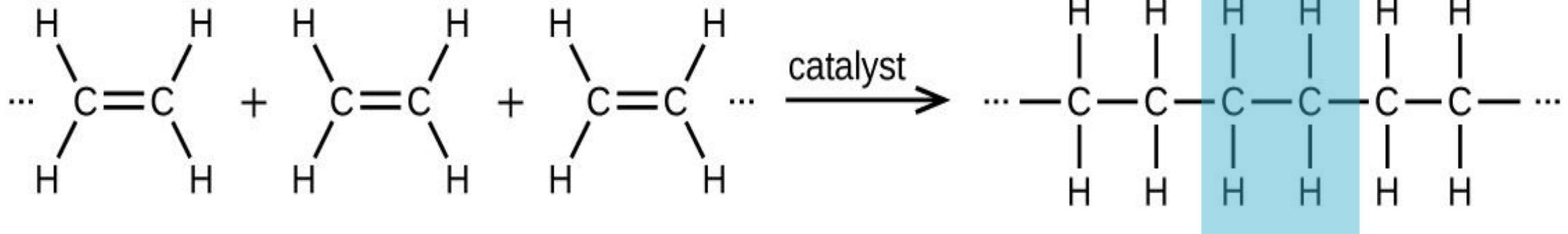


**Monomers**  
Ethene

**Polymer**  
Polythene/polyethylene



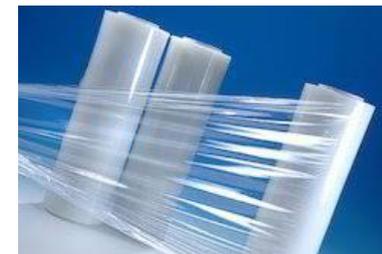
# Plastics



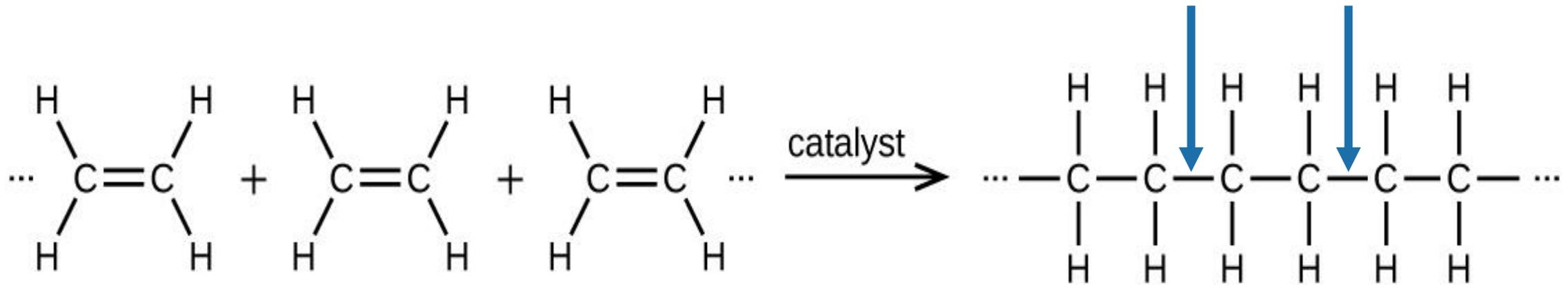
**Monomers**  
Ethene

**Polymer**  
Polythene/polyethylene

10,000 – 100,000 repeating units in each polythene molecule



# Problems with plastic?



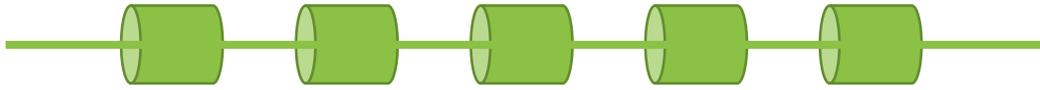
# Problems with plastic?



# Understanding bioplastics

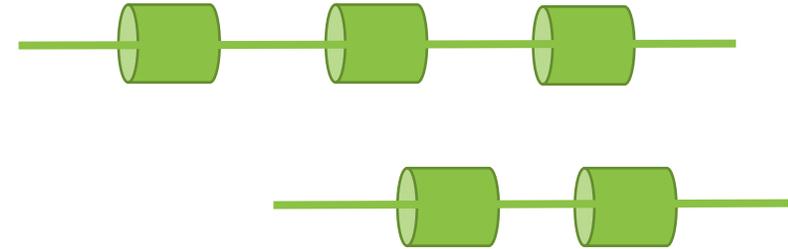
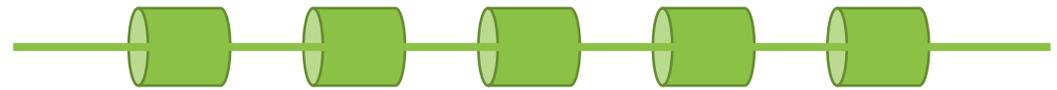
- Biobased
  - produced from biomass, either wholly or in part
- Biodegradable
  - metabolised by microorganisms into organic biomass, carbon dioxide or methane, inorganic compounds and water





Carbon dioxide  
Methane  
Water  
Biomass (more microorganisms)

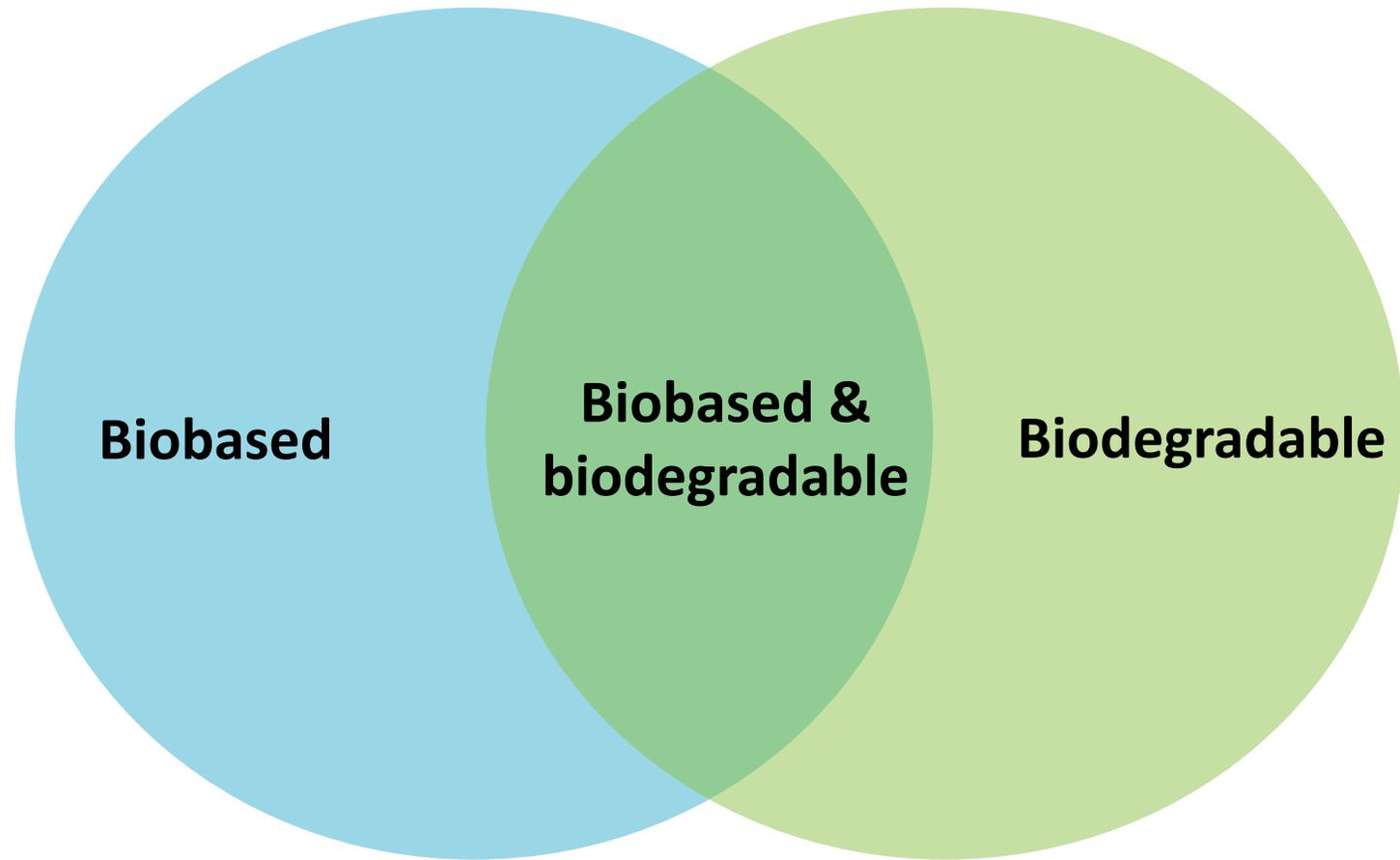
## Biodegradation

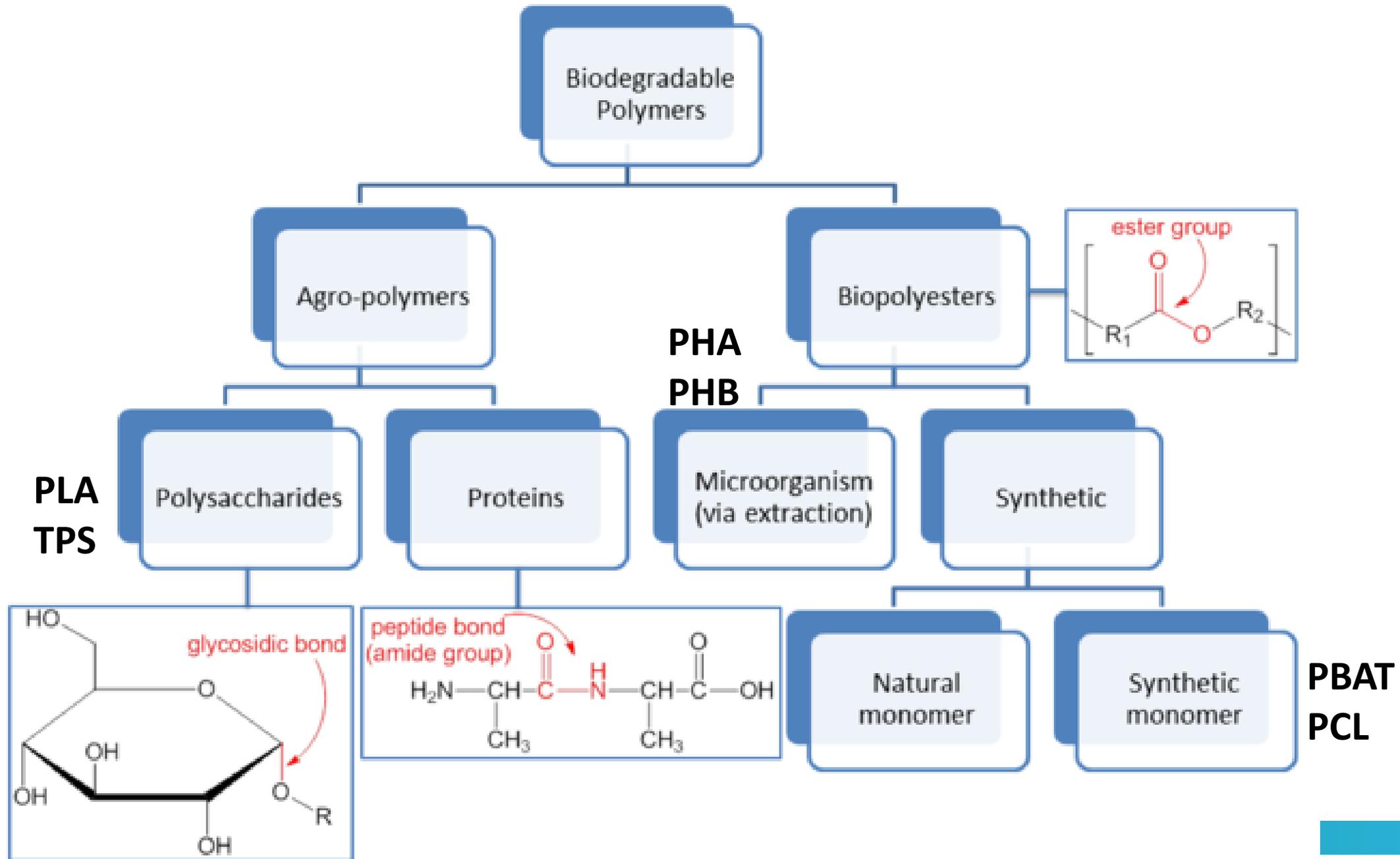


## Degradation

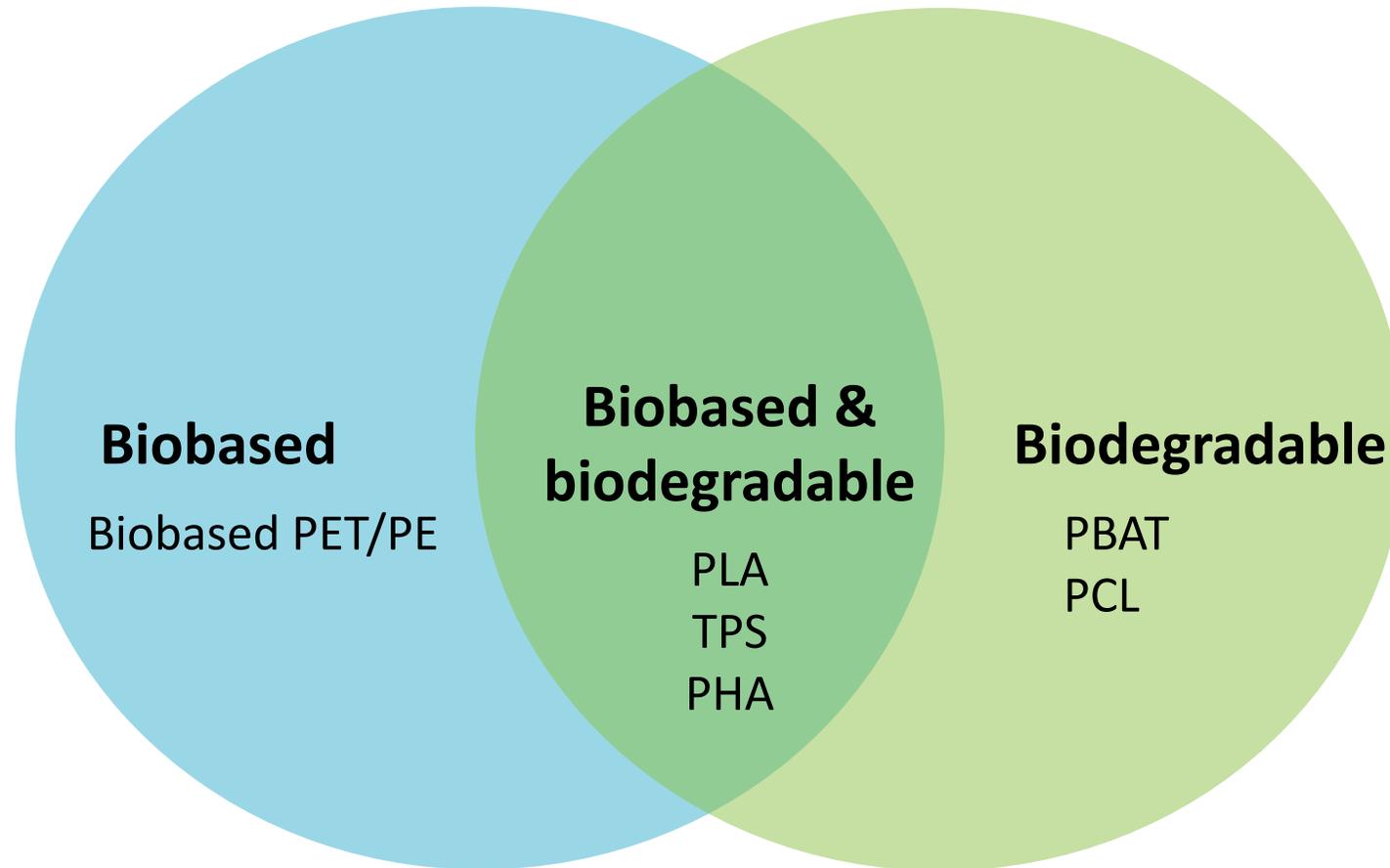


# Bioplastics





# Bioplastics

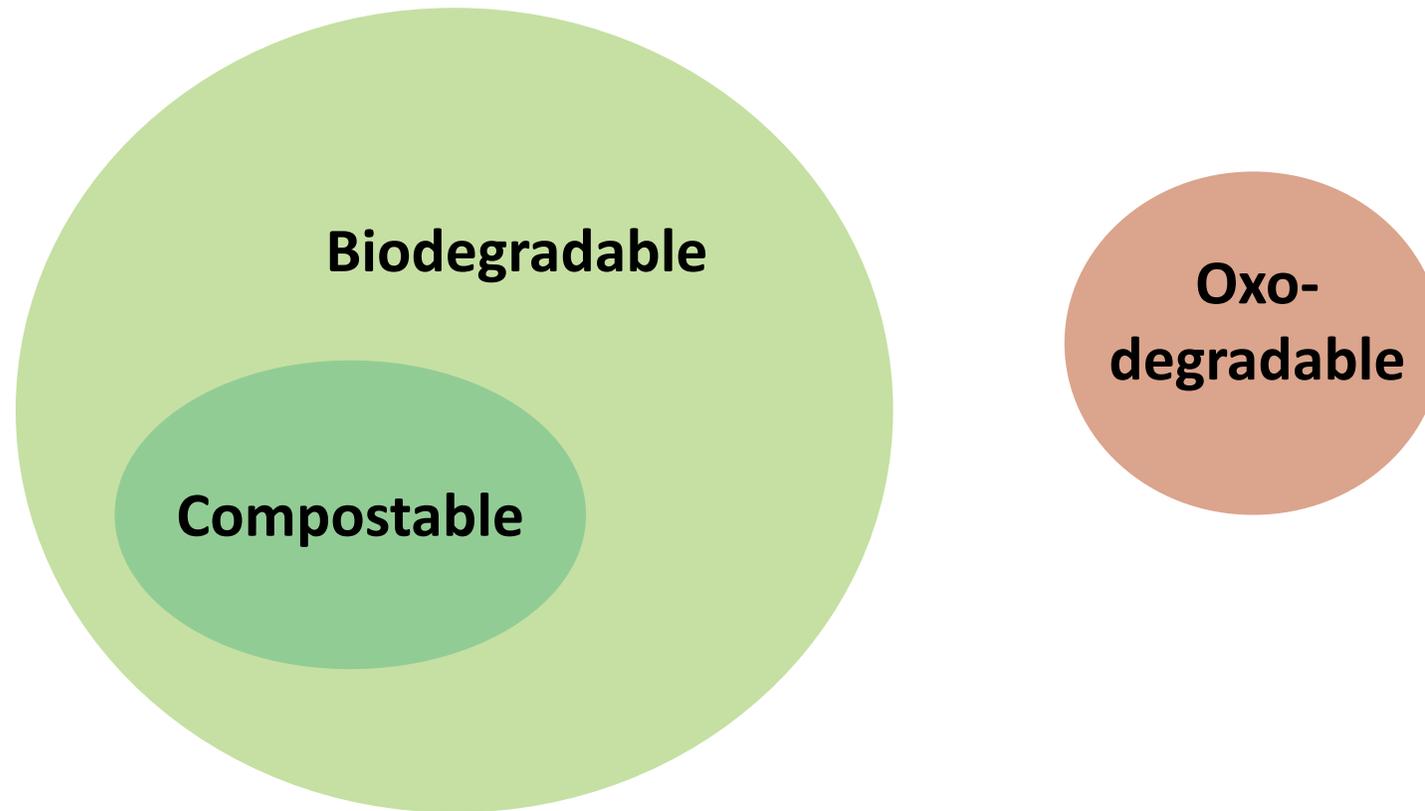


# Biodegradable? Compostable? Oxo-degradable?

- Biodegradable
- Compostable
  - material or product able to be biodegraded in a composting process without leaving any visible, distinguishable or toxic residue; and under managed conditions, inclusive of, temperature, humidity and time-frame, in a composting facility
- Oxo-degradable
  - material or product designed to break-down by accelerated oxidation and fragmentation through the addition of chemicals under the action of oxygen and UV light or UV light and heat



# Biodegradable? Compostable? Oxo-degradable?



# Implications for disposal

- Industrial composting facilities
- Education and awareness
- Appropriate labelling

