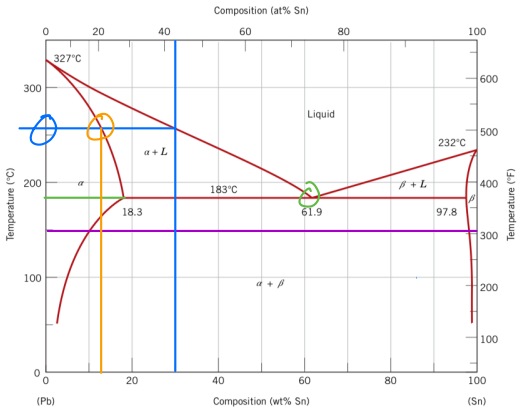
ENGR145 HW5

10.13)



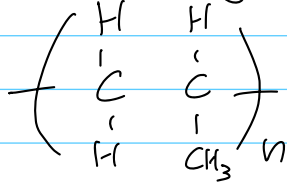
a) Liquid forms at 183°C

b) The composition of this liquid phase at 183°C is 61.9 wt% Sn

c) Given the alloy is 30 wt% Sn, complete melting occurs around 260 °C

d) At 260°C, The wt% of the last solid phase is about 13 wt% Sn

4.4) Polypropylene



a) m = repeat unit mass

$m = 6(1.01) + 3(12.0) = 42.09\ g/mol$

b) $DP = \frac{\overline{M_n}}{m} \Rightarrow (DP)(m) = \overline{M_n}$

$\overline{M_n} = (15000)(42.09\ g/mol) = 631350\ g/mol$

4.13) a) Thermoplastics harden with heat and soften while cooling. Thermoset polymers are permanently hard and do not soften upon heating.

b) Thermoplastics generally have branched structures and flexible chains, while thermoset polymers are crosslinked

4.14) a) Phenol formaldehyde is a thermoset polymer, so it cannot be ground up and reused.

b) Polypropylene is a thermoplastic polymer, so it can be ground up and reused.

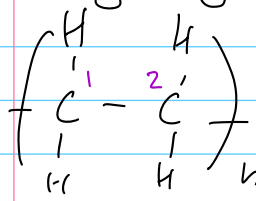
4.23) c) Linear and atactic PVC would be less likely to crystallize due to the irregularity of unit arrangements.

b) Linear and syndiotactic polypropylene is more likely to crystallize because there are few restrictions on chain alignment. Cross linked molecules are almost always amorphous because crosslinks prevent chains from rearranging.

c) Network phenol-formaldehyde would be less likely to crystallize because crosslinks prevent the polymer chains from rearranging into a crystalline structure. This is also a much bigger chain, leading to lower crystallinity.

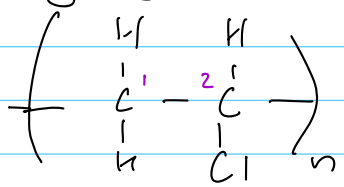
Hybridization Practice

Polyethylene



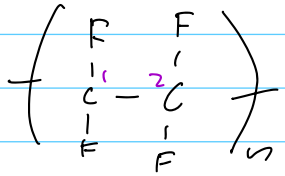
Carbons 1 and 2 are sp^3

Polyvinyl chloride (PVC)



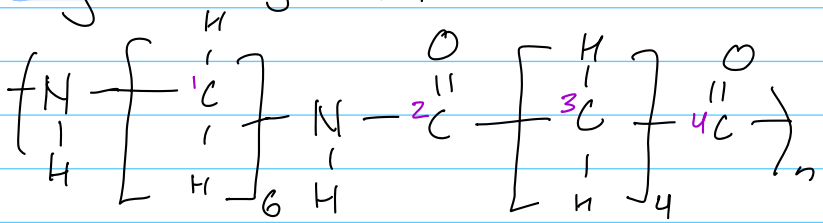
Carbons 1 and 2 are sp^3 hybridized

Polytetrafluoroethylene



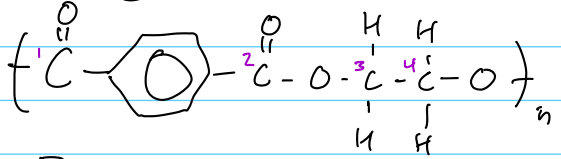
Carbons 1 and 2 are sp^3 hybridized

Polyhexamethylene adipamide



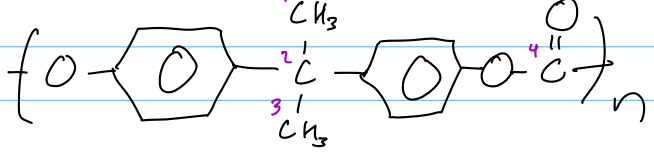
Carbons 1 and 3 are sp^3 hybridized
Carbons 2 and 4 are sp^2 hybridized

Polyethylene terephthalate



Benzene carbons are sp^2 hybridized
Carbons 1 and 2 are sp^2 hybridized
Carbons 3 and 4 are sp^3 hybridized

Polycarbonate



Benzene carbons are sp^2 hybridized
Carbons 1, 2, 3 are sp^3 hybridized
Carbon 4 is sp^2 hybridized