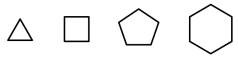
HW06 - Plastics & Polymers

1 2 points

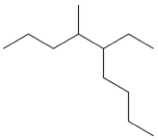
Name these cycloalkanes from the chembook (in order):



- propane, butane, pentane, hexane
- trigonal, tetrahedral, pentagonal, hexagonal
- cyclopropane, cyclobutane, cyclopentane, cyclohexane
- cyclobutane, cyclopropane, cyclohexane, cycloheptane
- triforce, square, military industrial complex, portal to hell
- triangle, square, pentagon, hexagon

2 2 points

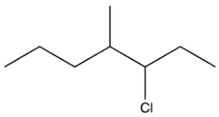
Name the following organic compound:



- 4-butyl-4-methylheptane
- 3-heptyl-4-methylnonane
- 3-butyl-4-propylpentane
- 5-ethyl-4-methylnonane

3 2 points

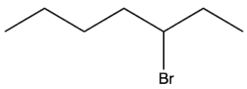
Name the following organic compound:



- 5-chloro-4-methylheptane
- 4-methyl-3-chloroheptane
- 3-chloro-4-methylheptane
- 5-chloroethyl-4-propylpentane
- 3-chloro-4-propylpentane

4 2 points

Name the following organic compound:



- 3-bromoheptane
- 5-bromoheptane
- 1-bromo-1-ethylpentane
- 5-bromobutane

5 6 points

Which step of the addition mechanism both increases the length of the polymer chain AND produces a free radical to continue the reaction?

- propagation
- perpetuation
- termination
- initiation
- addition

6 4 points

Which of the following properly outlines the addition mechanism as it pertains to polymer formation?

- Hetereolytic Cleavage - Propagation - Condensation - Termination
- Initiation - Propagation - Condensation - Termination
- Initiation - Termination - Propagation
- Initiation - Propagation - Termination

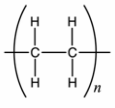
7 6 points

Two condensation reactions that we talk about in this class involve making PET and peptides. What are the functional groups involved in these two processes? Note: two answers are correct.

- [ ] alcohol, ester
- [ ] ketone, alcohol
- [ ] aldehyde, ether
- [ ] carboxylic acid, alcohol
- [ ] amine, carboxylic acid

8 6 points

Which recycle symbol (number) would you most likely find on a large milk container made from the following monomer:



- 1
- 6
- 4
- 5
- 2

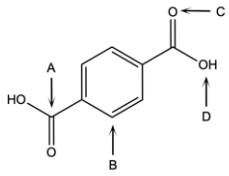
9 6 points

LDPE polymers are _____ branched than HDPE, resulting in greater _____.

- more, strength
- less, strength
- less, flexibility
- more, flexibility

10 6 points

Observe the structure below and answer the next two questions.



Which arrow is pointing to a carbonyl carbon?

- D
- C
- A
- B

11 6 points

On this same structure, which group will be **removed** in the condensation mechanism?

- D
- C
- B
- A

12 4 points

Fabrics often list their contents in generic terms, rather than proprietary ones. What might you find on the care tag of a nylon garment?

- silk
- Kevlar
- polystyrene
- polyester
- polyamide

13 4 points

Which of the following polymers are made via an *addition* reaction mechanism?

- [ ] Polyethylene Terephthalate
- [ ] Nylon
- [ ] Polystyrene
- [ ] Polyethylene
- [ ] Polypropylene
- [ ] Polyvinyl Chloride
- [ ] Bakelite

14 4 points

Five of the six "Big 6" plastics are composed of nearly the same repeating monomer, but with differing functional groups substituted into a single position. What is the functional group unique to polypropylene?

- ○ halide
- ○ methyl
- ○ amine
- ○ carboxyl
- ○ alcohol

15 6 points

Which of the following functional groups is the distinguishing feature of the monomer used to manufacture styrofoam?

- ○ a halide group
- ○ an amine group
- ○ a ester group
- ○ a phenyl group
- ○ a benzyl group

16 6 points

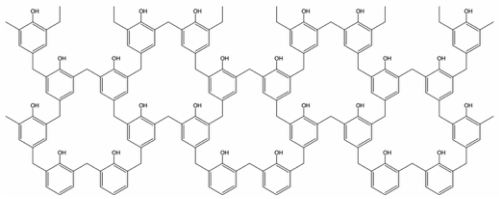
The following three common plastic items are most likely to be composed of which three Big 6 plastics? (identify the plastics by their recycling number)

- Disposable coffee cup
- Plumbing pipe
- Carbonated drink bottle

- ○ 3, 1, 4
- ○ 5, 2, 3
- ○ 2, 4, 6
- ○ 6, 3, 1

17 4 points

Below is an image of the bakelite copolymer, used back in the day for things like bowling balls, radios, telephones. Given that it is a copolymer between an alcohol and aldehyde, which of the following reaction types forms this structure?



- ○ addition
- ○ elimination
- ○ propagation
- ○ condensation
- ○ rearrangement

18 4 points

The bakelite polymer consists of phenol and formaldehyde. In the real world, why does this polymer **not** look as organized as it does in two dimensions?

- ○ the methylene links are flat and rigid
- ○ the carbon-carbon bonds in the phenol groups can rotate and branch in different directions
- ○ the phenol groups are flat
- ○ the methylene links can rotate and branch in different directions

19 6 points

Which of the following is/are made from amino acid monomers?

- [ ] cellulose
- [ ] biological proteins
- [ ] wool
- [ ] fats
- [ ] starch
- [ ] silk

20 3 points

Which of the following can be glucose polymers?

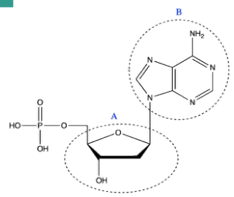
- [ ] silk
- [ ] proteins
- [ ] cotton
- [ ] carbohydrates
- [ ] wool
- [ ] flax

21 3 points

There are many different types of proteins. What makes a protein unique?

- ○ the various sugar monomers that make up the protein chain
- ○ the carboxylic acid and amine functional groups on the amino acid monomers
- ○ the fact that all amino acids have the same functional groups
- ○ the identity of the R-side chain on the amino acid monomers that make up the polymer

22 4 points



What do A and B represent on the DNA nucleotide above?

- ○ A = deoxyribose, B = R-group
- ○ A = deoxyribose, B = nitrogenous base
- ○ A = deoxyribose, B = glycosidic linkage
- ○ A = ribose, B = nitrogenous base
- ○ A = ribose, B = polyamine

23 2 points

Consider the biological polymer of DNA. There are two monomer units (a copolymer) that make up the backbone chain - what is the repeat unit here? Hint: you can look at the previous question to see the structure.

- ○ phosphate + deoxyfructose
- ○ phosphate + glucose
- ○ ester + deoxyribose
- ○ peptide link + ribose
- ○ phosphate + deoxyribose

24 2 points

Describe the product(s) of condensation polymerization.

- ○ A single polymer radical
- ○ Two polymers split by homolytic cleavage
- ○ A single elongated polymer
- ○ A larger copolymer and a small molecule, like water