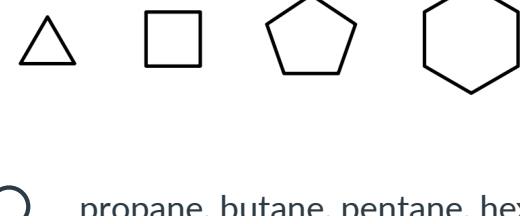


# HW06 - Plastics & Polymers

1 2 points

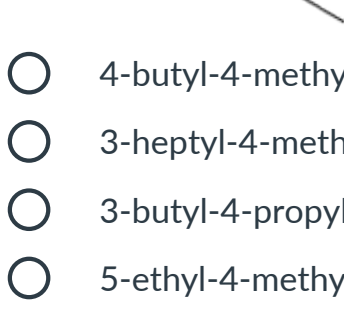
Name these cycloalkanes from the chembook (in order):



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

2 2 points

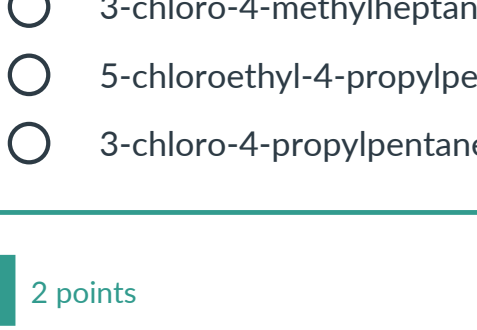
Name the following organic compound:



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

3 2 points

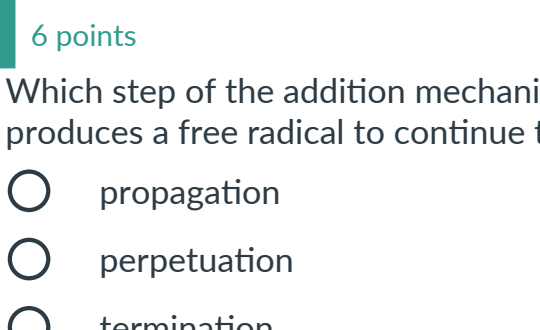
Name the following organic compound:



- 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?

- Heterolytic Cleavage - Propagation - Condensation - Termination
- Initiation - Propagation - Condensation - Termination
- Initiation - Termination - Propagation
- Initiation - Propagation - Termination

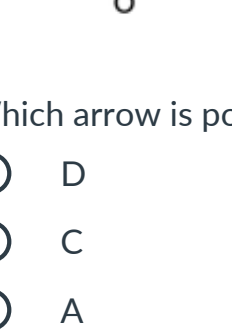
7 6 points

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

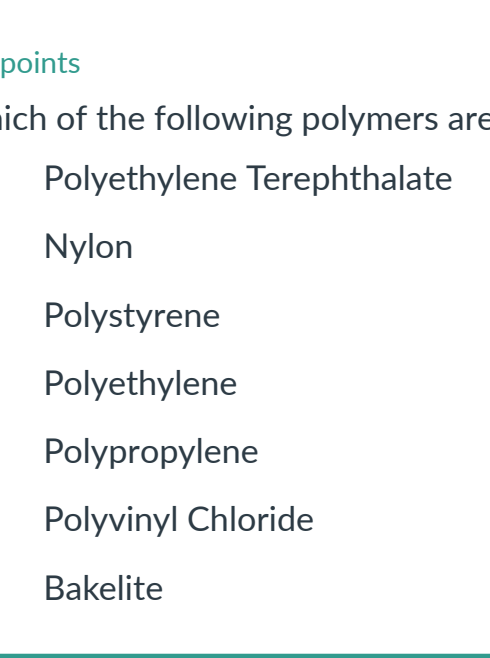
9 6 points

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

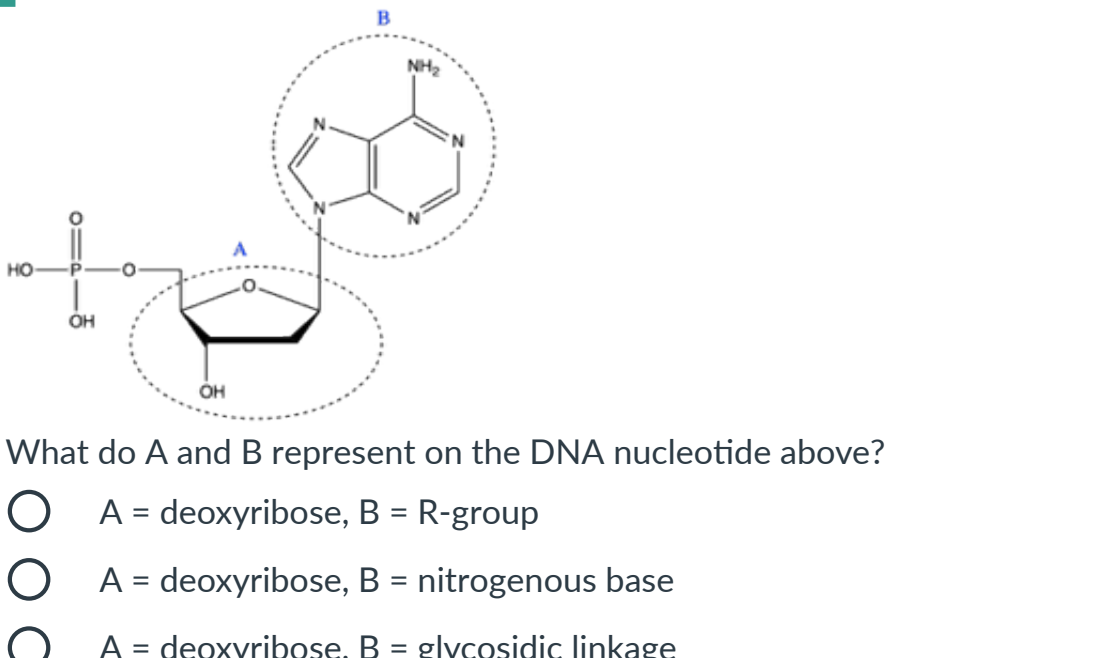
The following three common plastic items are most likely to be composed of which three Big 6 plastics? (identify the plastics by their recycling number)

- 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