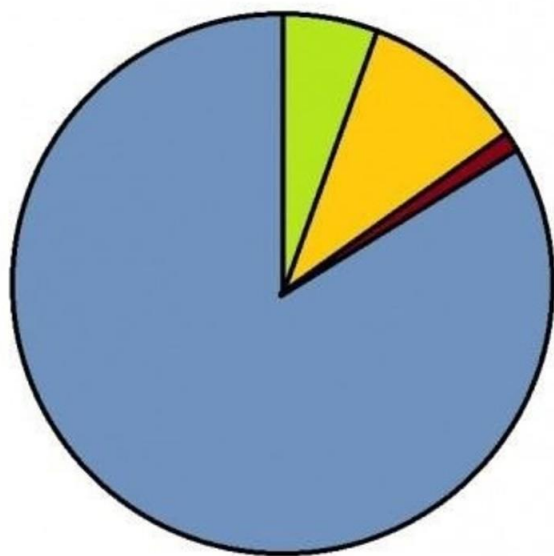
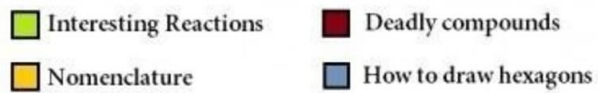


Nov 11-15 Practice Problems

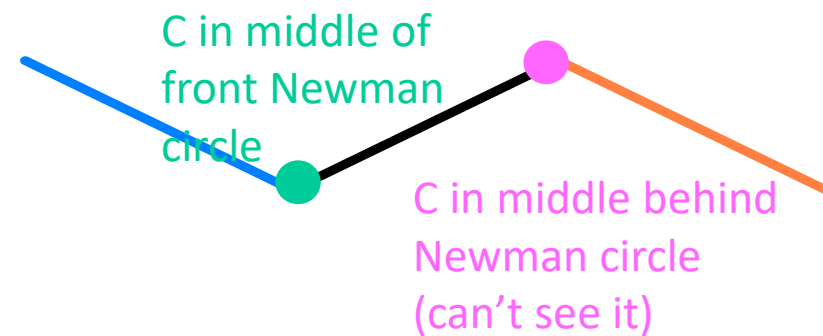
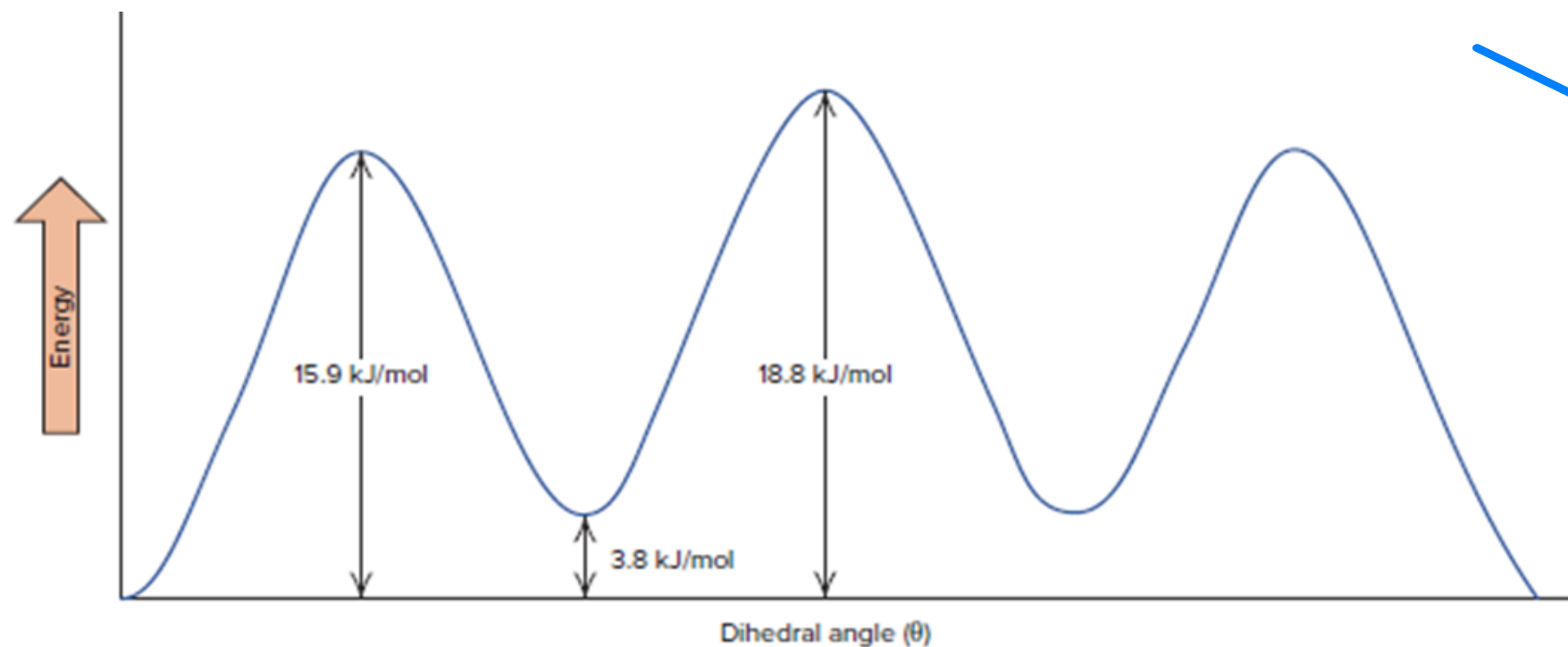
Things I learned in Organic Chemistry



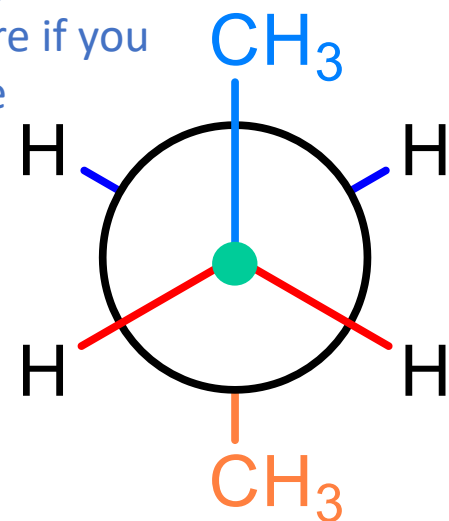
Due dates:

- Quiz 7 due Friday (on last week's content)
- Graded Review 7 end of this week as usual
- Office hours **Tuesday 5:30pm to 6:30pm in 104 Pulp and Paper Building**

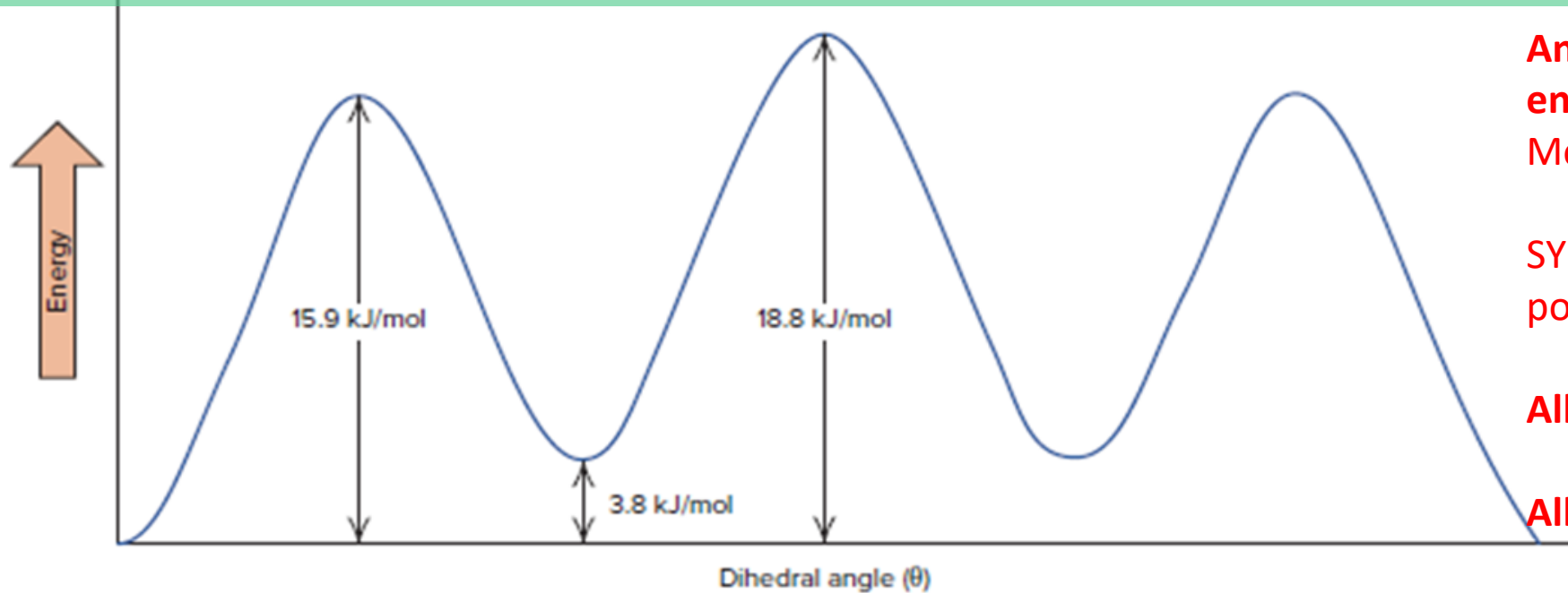
Q1: Fill in all the associated Newman projections for butane. Ensure the correct projection matches with the associated potential energy. Draw the most stable conformation as a sawhorse diagram.



Can use CH₃ or just sticks here if you like



Q1: Fill in all the associated Newman projections for butane. Ensure the correct projection matches with the associated potential energy. Draw the most stable conformation as a sawhorse diagram.

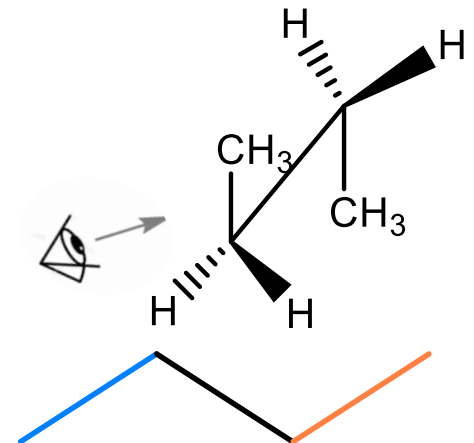
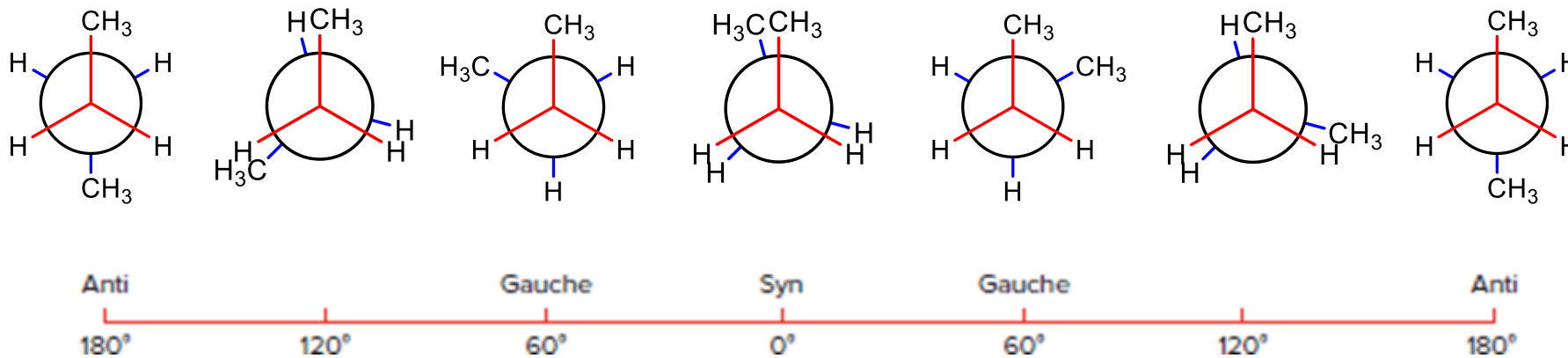


Anti: Most stable state with lowest energy. Bulky group in anti position. Most stable!

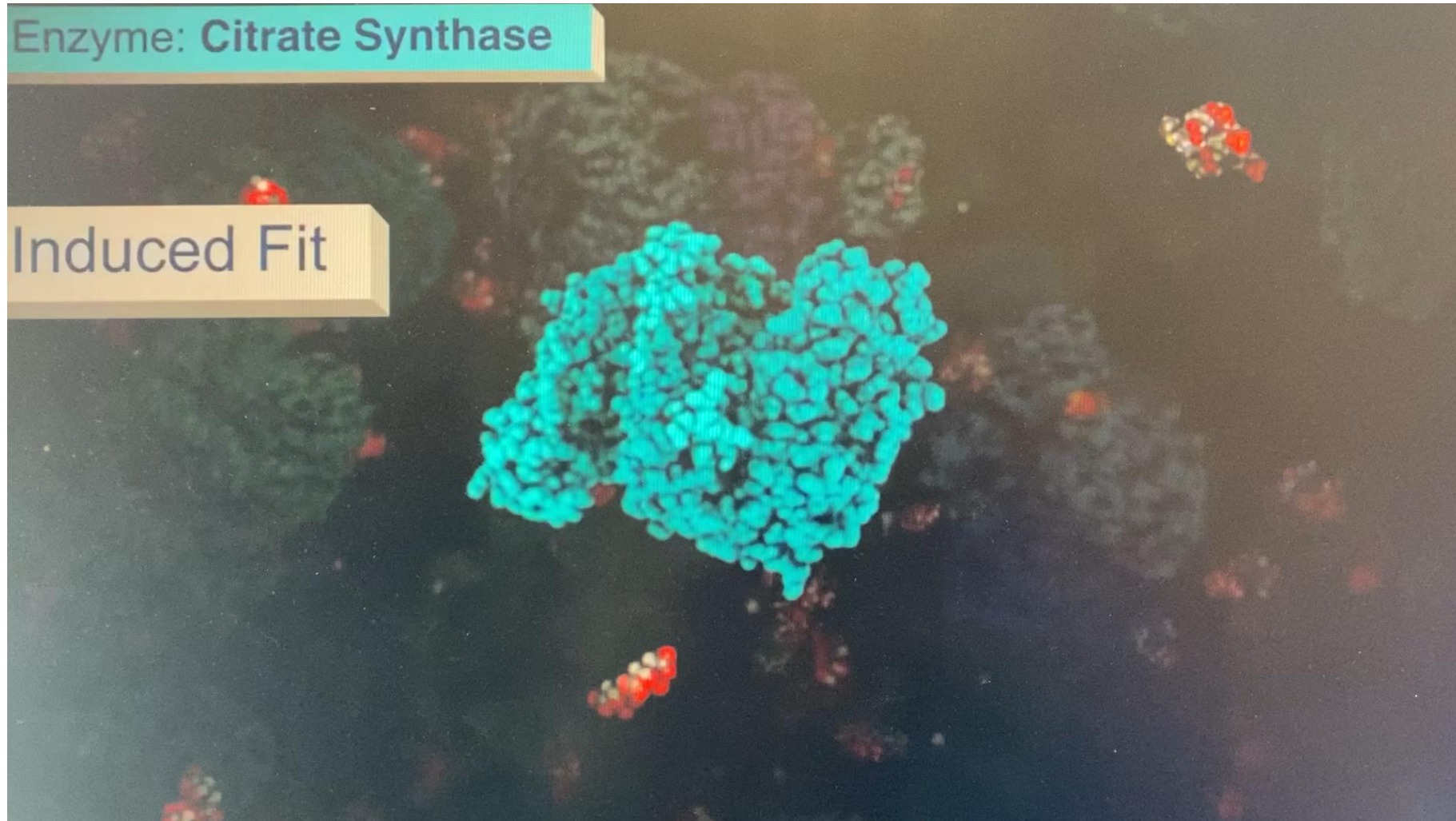
SYN: Most bulky group in SYN position. **Highest energy.**

All eclipsed are high energy

All staggered are low energy



Structure/conformation impacts function on larger scale.

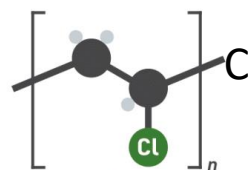


Q2: Circle and name the functional groups in these molecules. Specify primary, unsubstituted, etc. Note all the grey circles are carbon.

The plastic anatomy of a Barbie doll

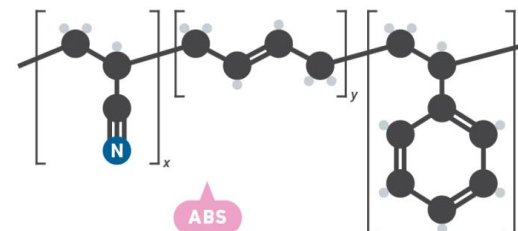


Head and hair



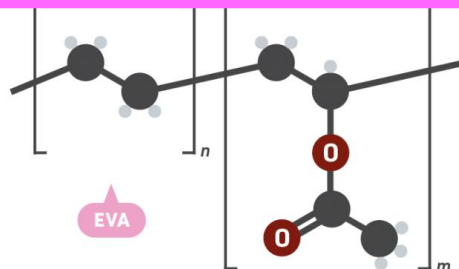
PVC

Torso



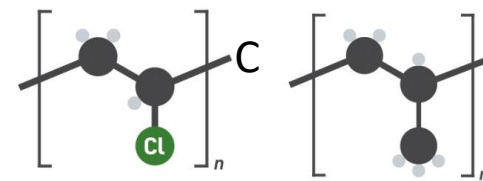
ABS

Arms



EVA

Legs

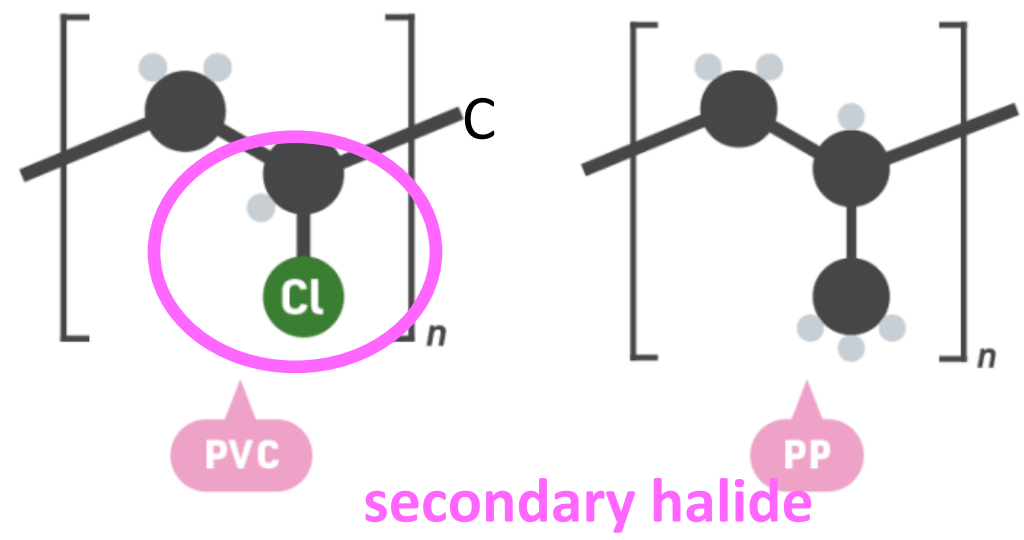
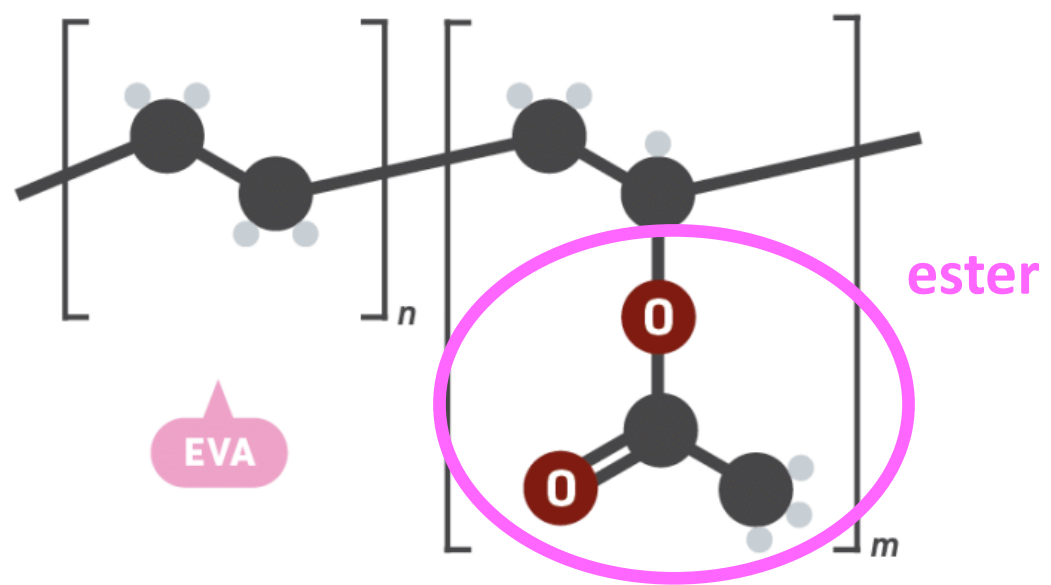
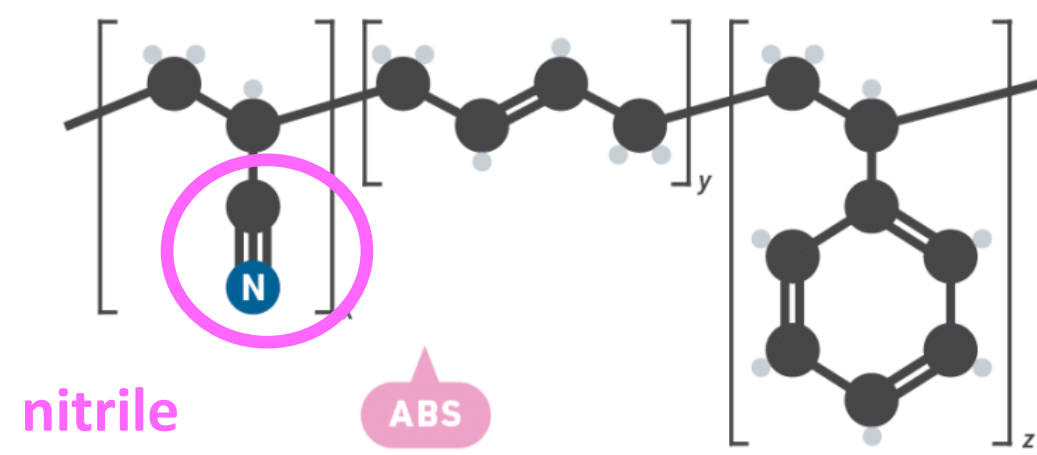
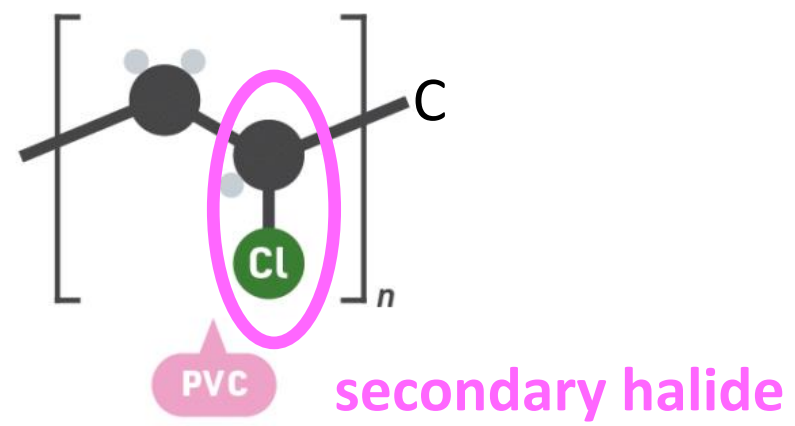


PVC

PP

KEY: ● Carbon ● Oxygen ● Nitrogen ● Hydrogen

Q2: Circle and name the functional groups in these molecules.
Specify primary, unsubstituted, etc.



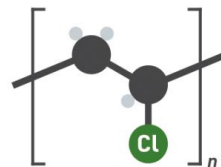
Q2: Circle and name the functional groups in these molecules.
Specify primary, unsubstituted, etc.

The plastic anatomy of a Barbie doll



Head and hair

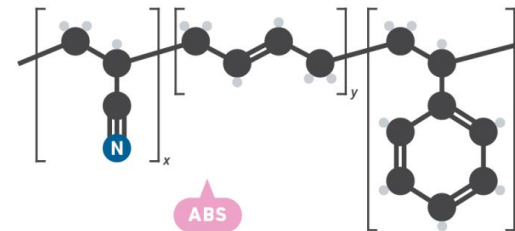
Barbie doll heads are made from polyvinyl chloride (PVC), mixed with plasticiser to make it more flexible. The hair is commonly made from polyvinylidene dichloride (PVDC), but other polymers including nylon and polypropylene.



PVC

Torso

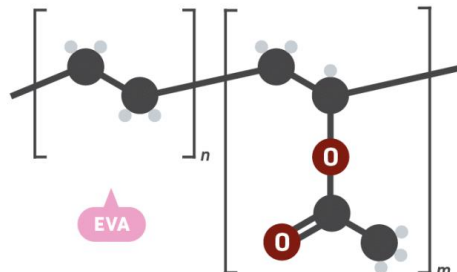
PVC was used for early Barbie doll torsos. Dolls from the mid-1960s to the mid-1970s used low density polyethylene (LDPE), while today's dolls use acrylonitrile butadiene styrene (ABS), the same plastic that Lego bricks are made of.



ABS

Arms

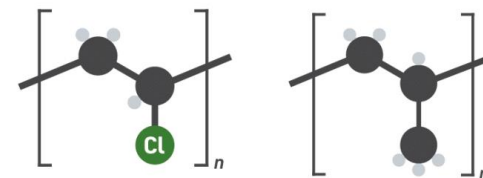
Historically, Barbie doll arms were made of PVC. Today, Barbie's arms are made of ethylene-vinyl acetate (EVA), a copolymer of ethylene and vinyl acetate which is soft and flexible.



EVA

Legs

Much like the other parts of the doll, PVC was used for the legs of early dolls. It's still used today, though the phthalate plasticisers used in early dolls have been replaced by safer alternatives. The bend-leg armatures are made of polypropylene (PP).

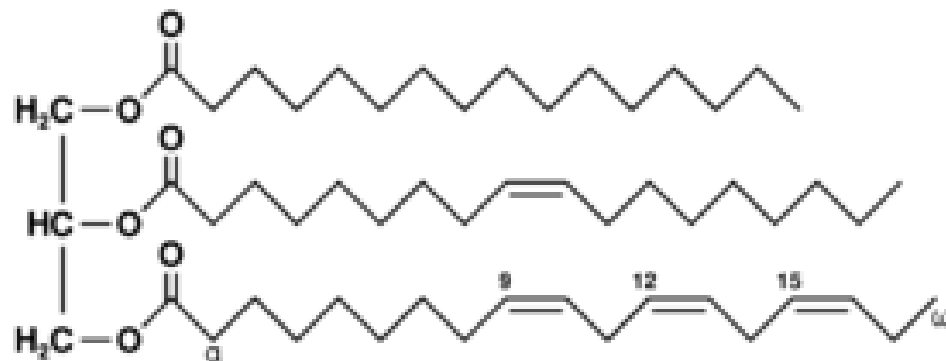


PVC

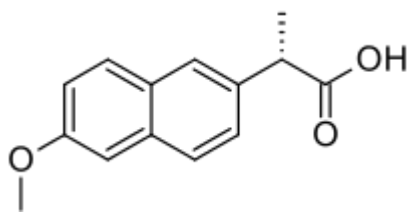
PP

KEY: ● Carbon ● Oxygen ● Nitrogen ● Hydrogen

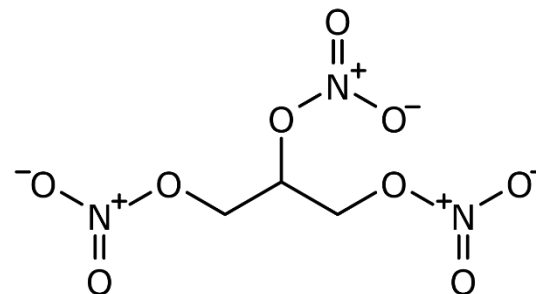
Q3: Circle and name the functional groups in these molecules. Specify primary, unsubstituted, etc.



triglyceride

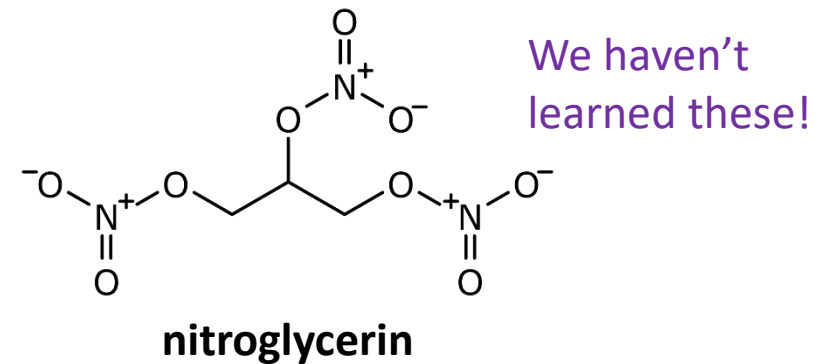
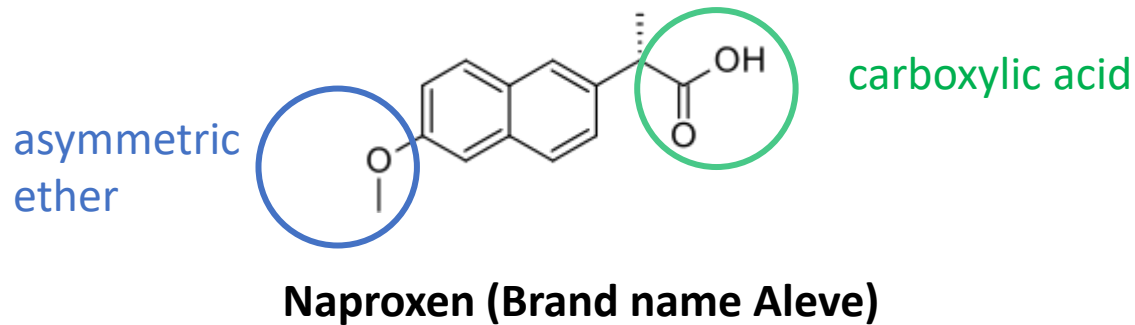
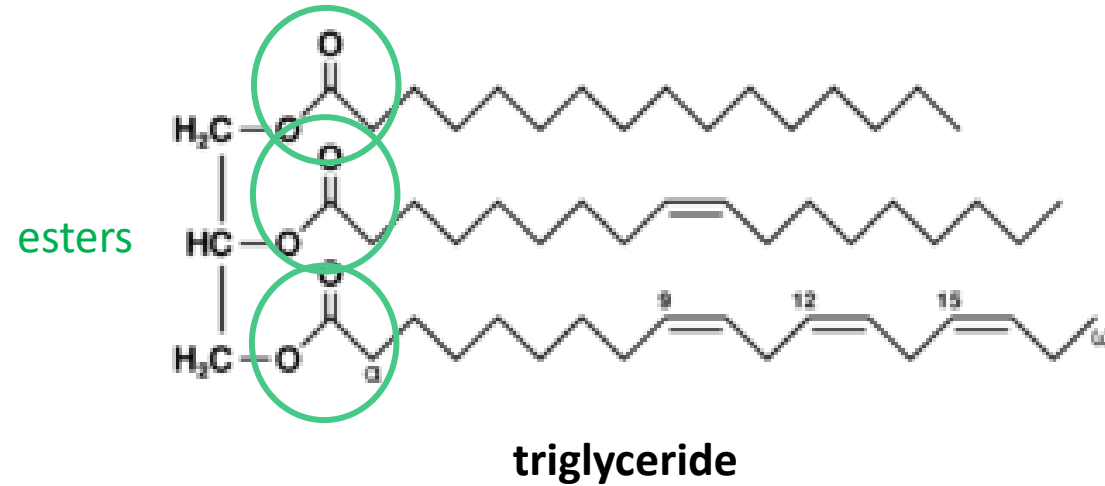


Naproxen (Brand name Aleve)

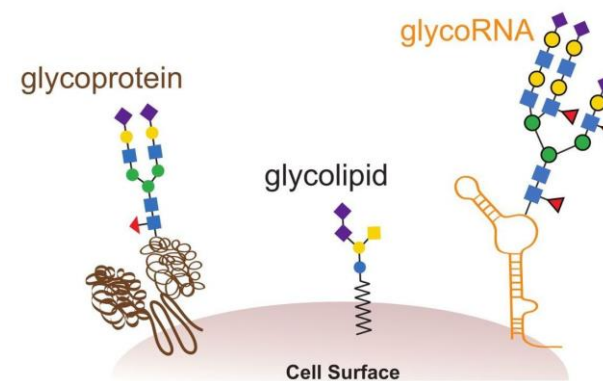
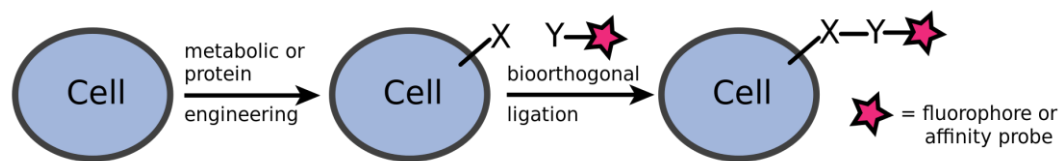
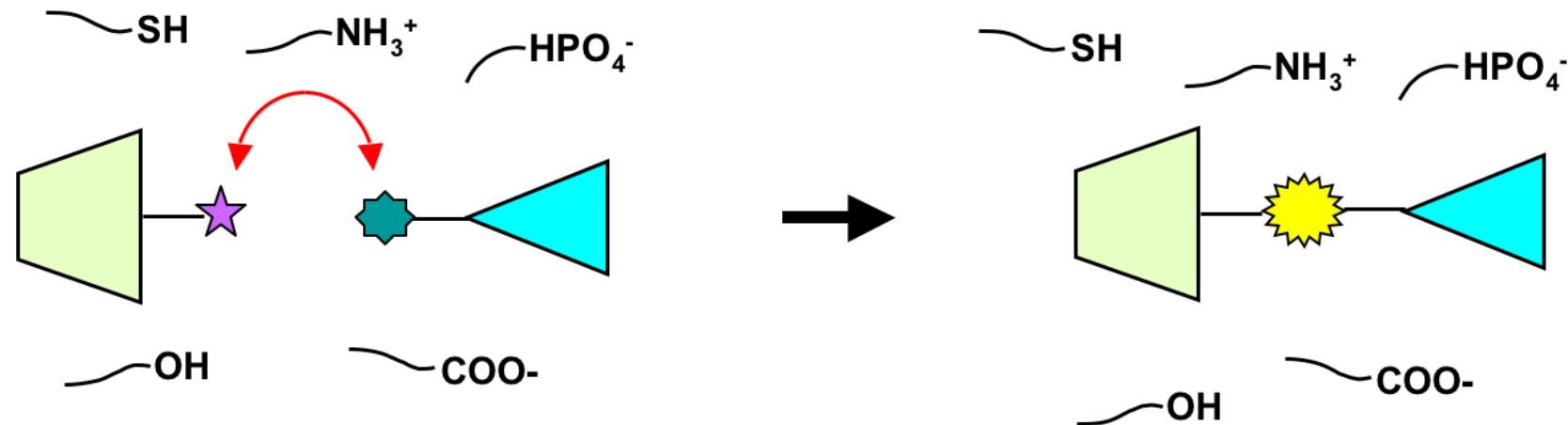


nitroglycerin

Q3: Circle and name the functional groups in these molecules. Specify primary, unsubstituted, etc.



Prof. Carolyn Bertozzi: Coined the term “bioorthogonal chemistry”



She is scientifically brilliant and soo cool

- Frequently voted (on twitter) for Nobel Prize and NOW is!!!!
- 2SLGBTQIA+
- Baker Family Director of Stanford ChEM-H
- Anne T. and Robert M. Bass Professor in the School of Humanities & Sciences
- Professor (by courtesy): Chemical and Systems Biology and of Radiology



Stanford was smart and “stole” her on time 😊

COMPANY	YEAR FOUNDED	FOCUS	BACKGROUND
Redwood Bioscience	2008	Antibody-drug conjugates	Sold in 2014 to Catalent Pharma Solutions
Enable Biosciences	2014	Rapid diagnostics	National Institutes of Health–funded biotech developing at-home diagnostics for diabetes and other diseases
Palleon Pharmaceuticals	2015	Immuno-oncology	Raised nearly \$48 million to develop glycoimmune checkpoint inhibitors
InterVenn Biosciences	2017	Glycoproteomic analysis	Raised \$9.4 million to use artificial intelligence for mass spectrometry for glycoproteomic analysis
Grace Science	2018	Rare-disease therapeutics	Drug development spin-off of a nonprofit devoted to researching NGLY1 deficiency
OliLux Biosciences	2019	Tuberculosis diagnostics	Developing trehalose-based rapid tuberculosis detection
Lycia Therapeutics	2019	Extracellular protein degradation	Backed by Versant Ventures to develop LYTACs technology



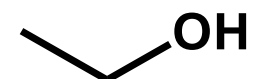
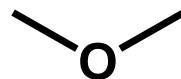
Editor-In-Chief (EIC)

ACS
central
science



Q4: Fill in the following for the pair of molecules. What kind of isomers are they?

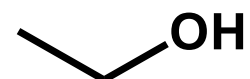
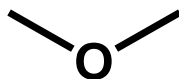
Skeleton:



Molecular formula:

Q4: Fill in the following for the pair of molecules. What kind of isomers are they?

Skeleton:



Molecular formula:



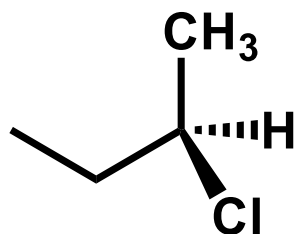
Functional isomers!

Q5: Draw a corresponding isomer (as indicated) for each molecule below.

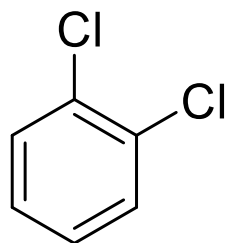
Skeletal:



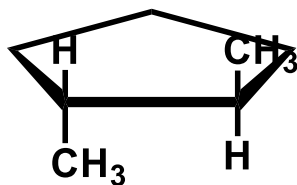
Enantiomer:



Positional:

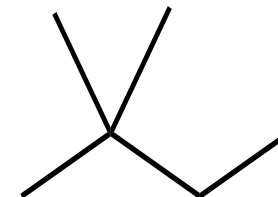
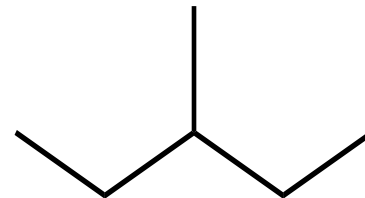


Geometric:

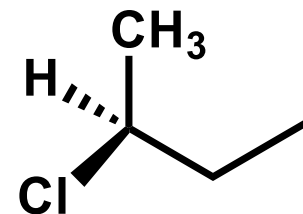
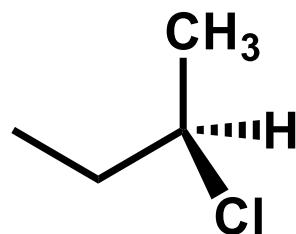


Q5: Draw a corresponding isomer (as indicated) for each molecule below.

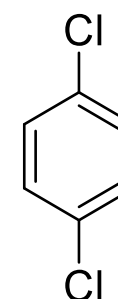
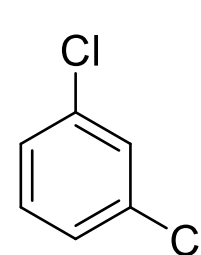
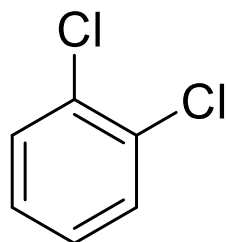
Skeletal:



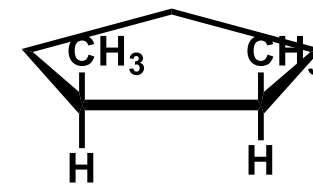
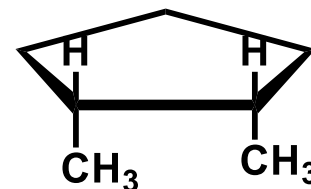
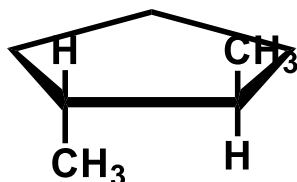
Enantiomer:

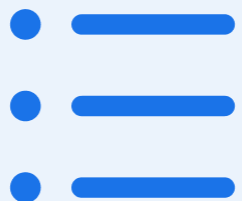


Positional:



Geometric:





Which of the following pairs are structural isomers?

Which of the following pairs are structural isomers?

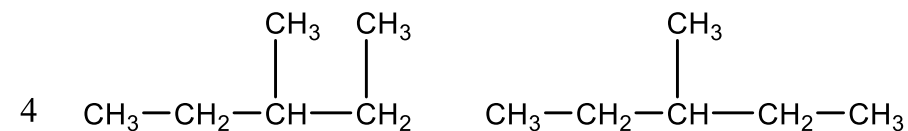
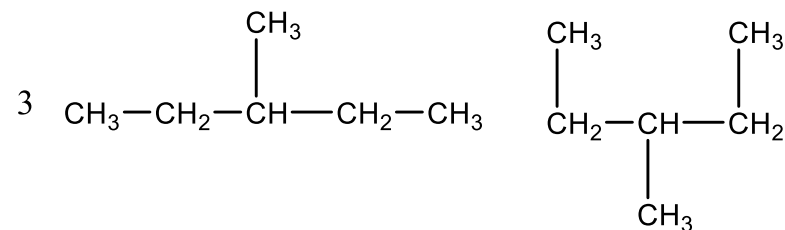
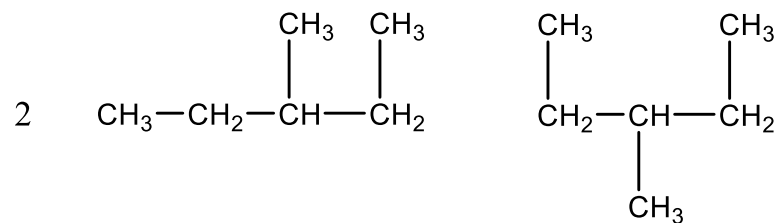
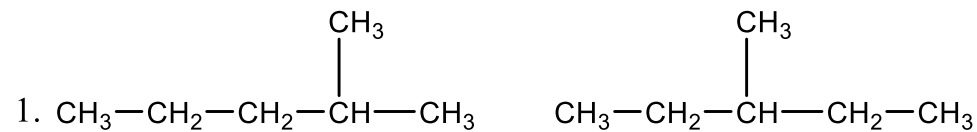
A. 1

B. 2

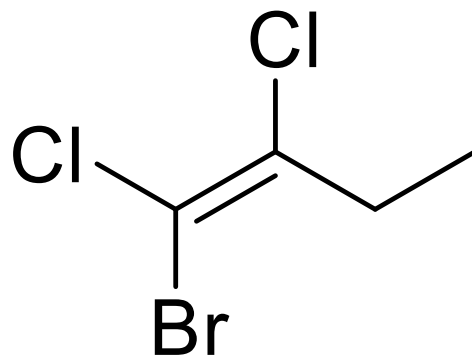
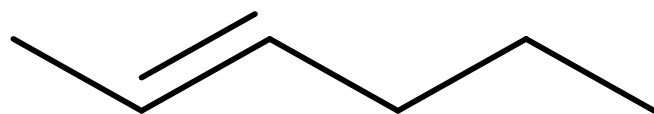
C. 3

D. 4

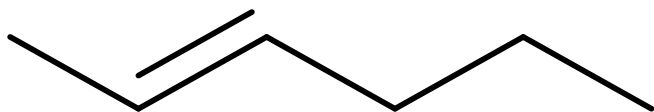
E. All



Q6: Name the following molecules using cis/trans or E/Z.

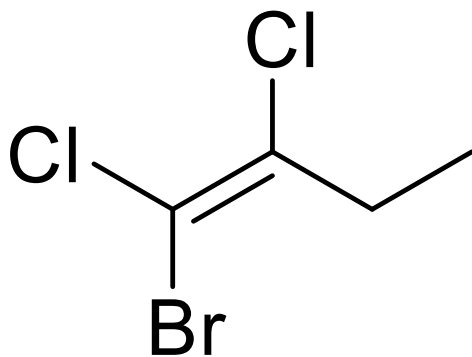
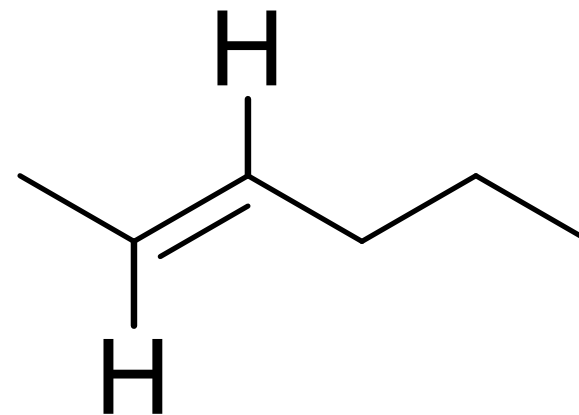


Q6: Name the following molecules using cis/trans or E/Z.



trans-hex-2-ene

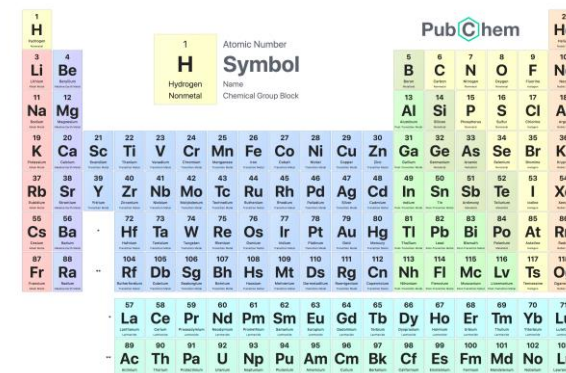
(*E*)-hex-2-ene



(*E*)-1-bromo-1,2-dichloro-but-1-ene

trans/cis not possible here because the double bond is at the end of the carbon chain

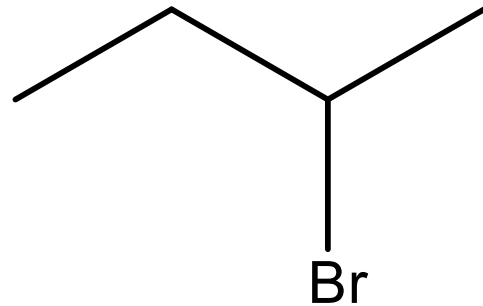
PERIODIC TABLE OF ELEMENTS



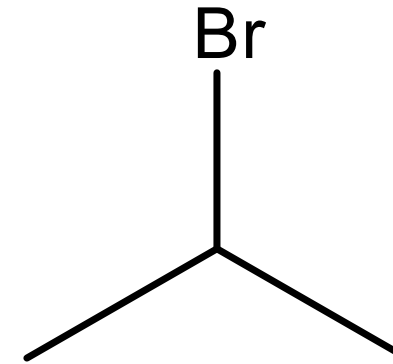
A standard periodic table of elements, color-coded by groups. It includes element symbols, atomic numbers, and names. The table is organized into rows and columns, with the main groups on the left and right, and the transition metals in the center.

Q7: Decide whether the bromoalkanes (a) $\text{CH}_3\text{CH}_2\text{CH}(\text{Br})\text{CH}_3$ and (b) $\text{CH}_3\text{CH}(\text{Br})\text{CH}_3$ are chiral.

Q7: Decide whether the bromoalkanes (a) $\text{CH}_3\text{CH}_2\text{CH}(\text{Br})\text{CH}_3$ and (b) $\text{CH}_3\text{CH}(\text{Br})\text{CH}_3$ are chiral.

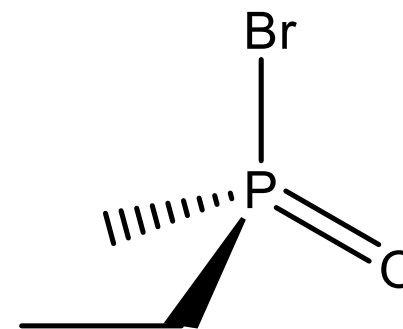
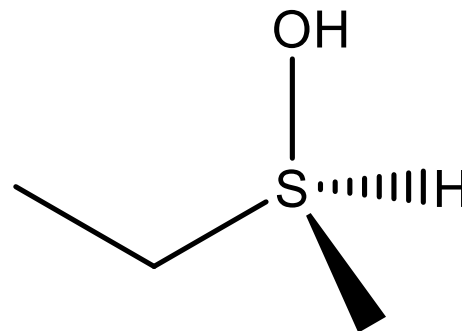
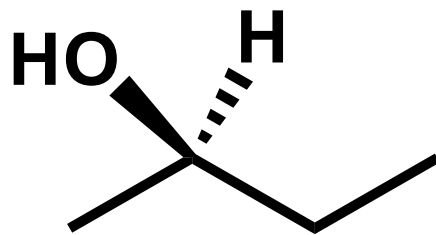
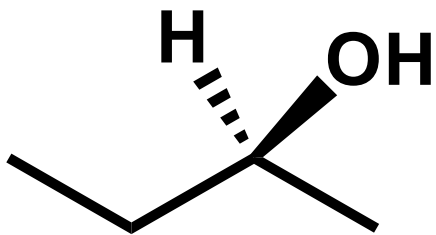
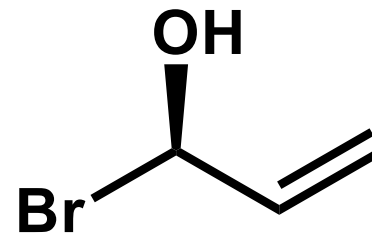
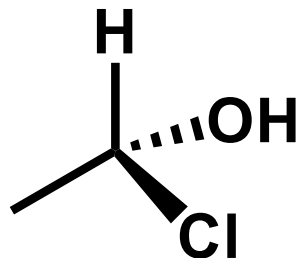
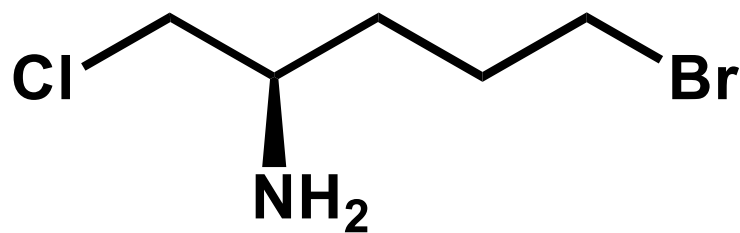


4 different groups, so chiral!

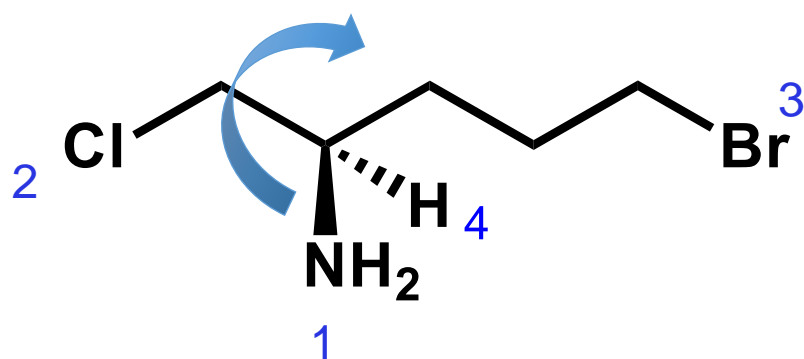


Two methyl groups, so only 3 different groups, this is “achiral” (not chiral)

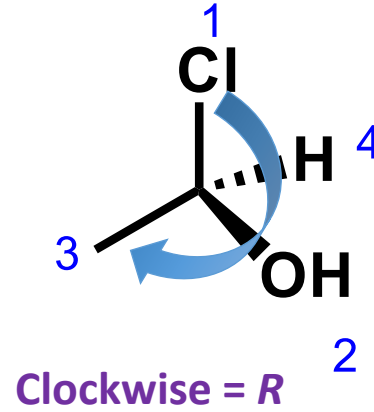
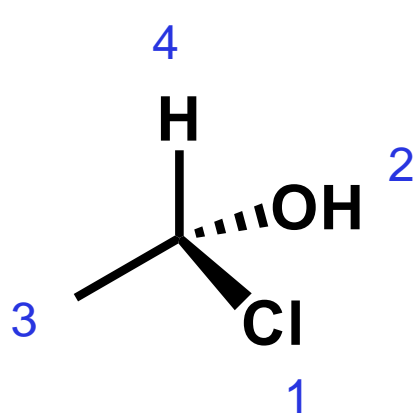
Q8: Indicate if the following molecules are R or S. Show your work!



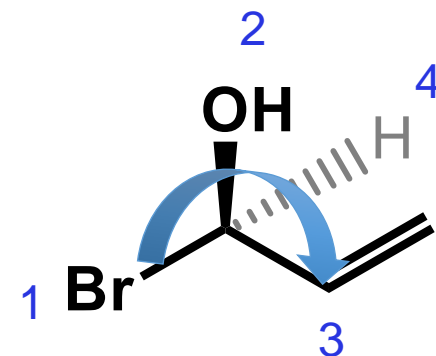
Q8: Indicate if the following molecules are R or S. Show your work! NEW



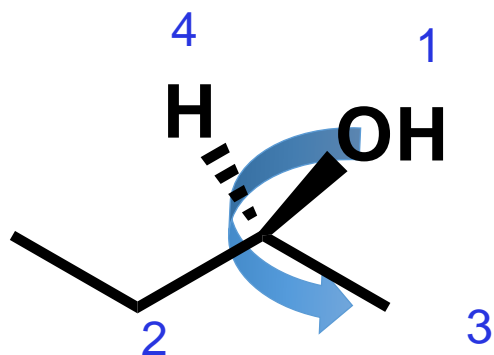
Clockwise = R



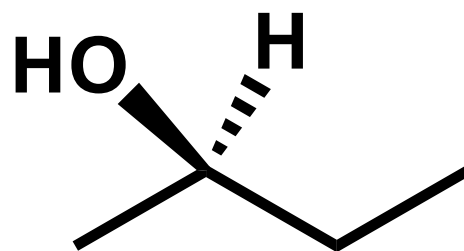
Clockwise = R



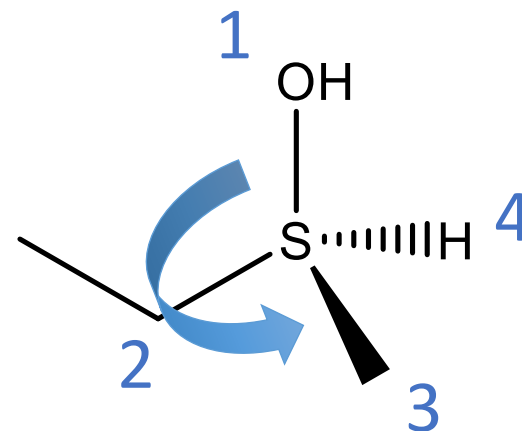
Clockwise = R



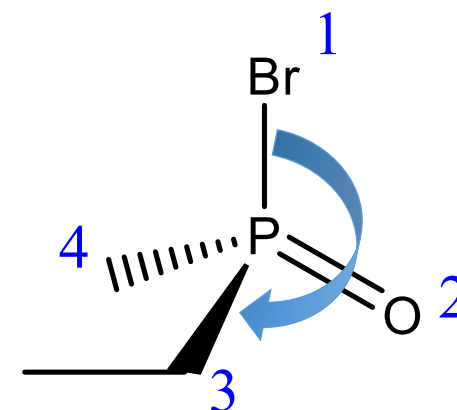
Counterclockwise = S



Clockwise = R



Counterclockwise = S



Clockwise = R



Which of the following is the Newman structure of the molecule below?

Answer: Which of the following is the Newman structure of the molecule below?

