

Student Packet: 10.3: Basic Organic Ideas: Student Handout**Basic physical properties**

- Organic molecules are covalently bonded compounds.
- They contain carbon; carbon will always want 4 bonds.
- Hydrocarbons are non-polar.
- Hydrocarbons are soluble in non-polar solvents. They are insoluble in water.
- Polar functional groups introduce molecular polarity.
- The polar OH group makes alcohols polar.
- Alcohols have much higher B. P.s than their corresponding hydrocarbon.
- Alcohols are soluble in water.

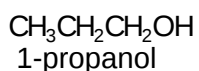
Isomerism

Isomers are molecules having different properties but the same molecular formula.

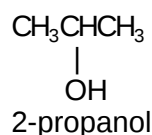
Structural Isomers - Structural isomers share the same molecular formula but have different structural formulas. IUPAC naming is essential to properly indicate each structural isomer.

For example look at propanol, C₃H₇OH.

The hydroxyl group could be at the end or on the second carbon atom.



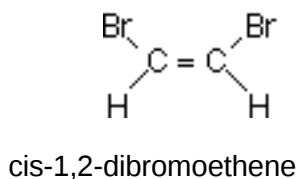
or



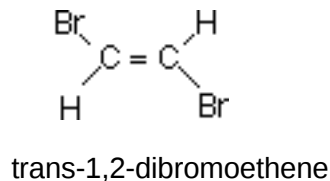
Geometric Isomers - Simply using IUPAC numbering is not enough to differentiate all isomers. Geometric isomers differ not in the location of the functional group but in its orientation. Molecules that form geometric isomers contain a rigid structure such as a double bond or arene about which rotation is constrained.

For example: 1,2-dibromoethene, CHBrCHBr:

(cis- close together)



(trans - far apart)



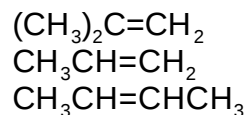
Student Packet: 10.3: Basic Organic Ideas: AssessMe questions

- 1) $\text{C}_3\text{H}_6\text{O}$ is an example of
- A) an aldehyde
 - B) an ester
 - C) an ether
 - D) an acid
 - E) I'm clueless
- 2) SiO_2 is _____ solid.
- A) an ionic
 - B) a metallic
 - C) a covalent
 - D) a molecular
 - E) I'm clueless
- 3) $\text{C}_3\text{H}_6\text{O}_2$ is an example of
- A) an amide
 - B) a ketone
 - C) an ether
 - D) an acid
 - E) I'm clueless
- 4) CaCO_3 is _____ solid.
- A) an ionic
 - B) a metallic
 - C) a covalent
 - D) a molecular
 - E) I'm clueless
- 5) Which species is paramagnetic?
- A) Mg^{2+} B) K^+ C) Sn^{2+} D) Cr^{3+} E) I'm clueless
- 6) Which element has the smallest first ionization energy?
- A) Mg B) F C) Ca D) Si E) I'm clueless

Student Packet: 10.3: Basic Organic Ideas: ShowMe questions

1) Draw structural formulas for all the isomers of $C_3H_4Cl_2$.

2) Which of the following compounds may exhibit cis, trans-isomerism?



3) Draw the structural formulas for all the isomers of dichlorobenzene.

4) State whether each compound is soluble or insoluble in water.

ethane, CH_3CH_3
methanol, CH_3OH
butane, $CH_3CH_2CH_2CH_3$
1-propanol, $CH_3CH_2CH_2OH$
hexane, $CH_3CH_2CH_2CH_2CH_2CH_3$
benzene, C_6H_6

Student Packet: 10.3: Basic Organic Ideas: TestMe questions

- 1) A cis-trans isomeric pair is possible for a compound that has which condensed structure?
- A) $\text{CH}_2=\text{CHCH}_3$
 - B) $\text{CH}_3\text{CH}=\text{CHCH}_3$
 - C) $(\text{CH}_3)_2\text{C}=\text{C}(\text{CH}_3)_2$
 - D) $\text{CH}_2=\text{C}(\text{CH}_3)_2$
 - E) None of the above
- 2) How many structured isomers have the molecular formula $\text{C}_2\text{H}_4\text{Cl}_2$?
- A) 1
 - B) 2
 - C) 3
 - D) 4
 - E) None of the above
- 3) Which of the following are structural isomers?
- A) ethanol; diethylether
 - B) 2-methylbutane; pentane
 - C) pentane; 2,2-dimethylbutane
 - D) methane; acetone
 - E) None of the above
- 4) Structural isomers:
- A) Have the same molecular formula.
 - B) Have different physical and chemical properties.
 - C) Have the same elemental composition.
 - D) All of the above.
 - E) None of the above.
- 5) Which statement properly explains the differences in physical properties for the isomers of $\text{C}_2\text{H}_4\text{O}_2$?
- A) The physical properties of the isomers are similar.
 - B) Geometric isomers experience strong Van der Waals attractions.
 - C) Polar and non polar isomers experience different intermolecular forces.
 - D) Hydrogen bonding occurs for all isomers.
 - E) Shield varies for each isomer.