

Friday worksheet 10

Organic – trends, chirality, isomers, atom economy and percentage yield.

- 1) Consider the table on the right.  
Account for the difference in the given physical properties of the cis and trans isomers of butane.

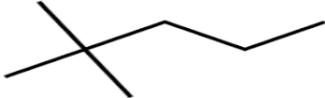
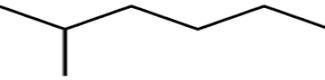
isomer	melting point (°C)	boiling point (°C)
cis-but-2-ene	-139	4
trans-but-2-ene	-106	1

- 2) Consider the table below.

Molecule	Structural formula	Type of intermolecular bonding	Boiling point °C
Pentane			36
2,2-dimethylpropane			10

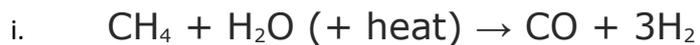
- Complete the table.
- Account for the difference in boiling temperature of the two molecules, with identical chemical formula (C<sub>5</sub>H<sub>12</sub>).

- 3) Consider the table below.  
a. Complete the table.

Name of molecule	Skeletal formula	Condensed formula
Propan-1-ol		
Propan-2-ol		
Butan-1-ol		
Butan-2-ol		
<i>trans</i> -pent-2-ene		
<i>cis</i> -pent-2-ene		
		
		

- b.
- State the molecules that have isomers that can rotate plane-polarised light in different directions and give the number of isomers that each molecule has.
  - What type of isomers do these two compounds represent?
  - Which two molecules represent structural isomers?
  - Which two molecules are isomers that have similar chemical properties but different physical properties?
  - Name the group that the isomers in iv. above belong to.
  - In the space provided on the right draw the skeletal formula and name another structural isomer of these two compounds that has the highest melting point of the three. Explain why.

4) Hydrogen is produced using methane gas via two methods as shown below.



a. Which is the most efficient way which creates the least amount of waste?

b. 300.23 litres of methane gas at 25.0 °C and 101.3 kPa pressure was reacted with excess steam to produce carbon monoxide and 50.01 grams of hydrogen gas.

i. What is the percentage yield for the reaction to the right number of significant figures?

ii. Using Le Chatelier's principle discuss two ways to increase the yield in a timely manner to meet the demand of an industrial production process.

iii. Hydrogen gas produced by either of the two reactions is not considered a green and renewable fuel. Explain why and describe under what conditions may hydrogen be considered a green and renewable fuel?