

**Unit**  
12

**Lesson**  
7

**AIM**

- Identifying/Drawing/Naming Isomer Practice

**AGENDA**

- U12L7 Lesson video
- Identifying/Drawing/Naming Isomer Practice

**YOYO**

- Watch the lesson video on YouTube (U12L7)

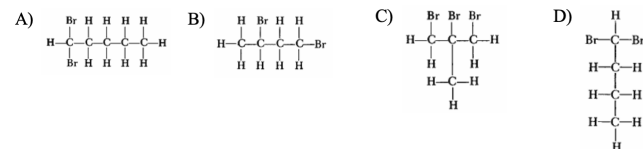
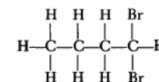
**HOMEWORK**

- CL#23 – Isomers – Due TONIGHT by 11:59 pm
- Follow calendar

1

### Question 1

Which structural formula represents a compound that is an isomer of the the following compound?



2

### Question 2

Which is an isomer of 2-chloropropane?

- Butane
- Propane
- 1-chlorobutane
- 1-chloropropane

3

### Question 3

Which is an isomer of  $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$

- $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_3$
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
- $\text{CH}_3\text{COOCH}_2\text{CH}_3$

4

### Question 4

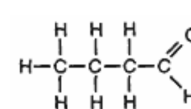
Which compound is an isomer of  $C_4H_9OH$ ?

- a.  $C_3H_7CH_3$
- b.  $C_2H_5OC_2H_5$
- c.  $C_2H_5COOC_2H_5$
- d.  $CH_3COOH$

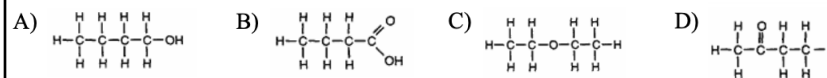
5

### Question 5

Give the compound:



What structural formula represents an isomer?



6

### Question 6

The two isomers of butane have different

- a. Formula masses
- b. Empirical formulas
- c. Molecular formulas
- d. Structural formulas

7

### Question 7

Two substances have different physical and chemical properties. Both substances have molecules that contain two carbon atoms, one oxygen atom, and six hydrogen atoms. These two substances must be

- a. Isomers of each other
- b. Isotopes of each other
- c. The same compound
- d. The same hydrocarbon

8

### Question 8

Which pair of compounds are isomers?

- a.  $\text{NO}_2$  and  $\text{N}_2\text{O}_4$
- b.  $\text{P}_2\text{O}_5$  and  $\text{P}_4\text{O}_5$
- c.  $\text{HCOOH}$  and  $\text{CH}_3\text{COOH}$
- d.  $\text{CH}_3\text{OCH}_3$  and  $\text{C}_2\text{H}_5\text{OH}$

9

### Question 9

If two compounds are isomers, they must have the same

- a. Vapor pressure
- b. Boiling point
- c. Percentage composition
- d. Structure

10

### Question 10

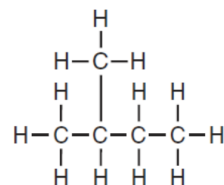
Which is an isomer of the compound propanoic acid,  $\text{CH}_3\text{CH}_2\text{COOH}$ ?

- a.  $\text{CH}_2=\text{CHCOOH}$
- b.  $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$
- c.  $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{OH}$
- d.  $\text{HCOOCH}_2\text{CH}_3$

11

### Question 11

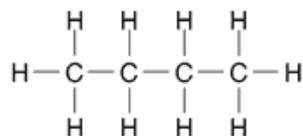
The formula below represents a hydrocarbon. In the space below, draw a structural formula for *one* isomer of this hydrocarbon.



12

### Question 12

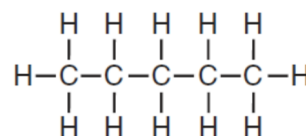
Given the structural formula for butane, draw the structural formula of an isomer of butane.



13

### Question 13

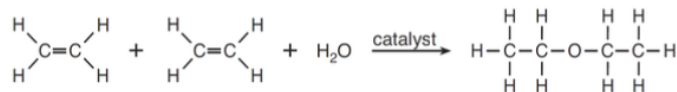
Given the structural formula of pentane, draw a structural formula for an isomer of pentane.



14

### Question 14

Diethyl ether is used as a laboratory and industrial solvent. The boiling point of diethyl ether at standard pressure is 34.6°C. The equation below represents a reaction that produces diethyl ether.



Draw a structural formula for an isomer of the product that has the same functional group.

15

### Question 15

Water, H<sub>2</sub>O, and hexane, C<sub>6</sub>H<sub>14</sub>, are commonly used as laboratory solvents because they have different physical properties and are able to dissolve different types of solutes. Some physical properties of water and hexane are listed on the table below.

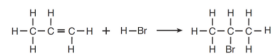
Physical Properties of H <sub>2</sub> O and C <sub>6</sub> H <sub>14</sub>			
Solvent	Boiling Point (°C)	Melting Point (°C)	Vapor Pressure at 69°C (kPa)
H <sub>2</sub> O	100.	0.	?
C <sub>6</sub> H <sub>14</sub>	69	-95	101.3

Explain, in terms of molecular formulas and structural formulas, why 2,2-dimethylbutane is an isomer of hexane.

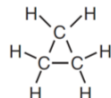
16

### Question 16

The equation below represents a reaction between propene and hydrogen bromide.



Cyclopropane, an isomer of propene, has a boiling point of  $-33^{\circ}\text{C}$  at standard pressure and is represented by the formula below.

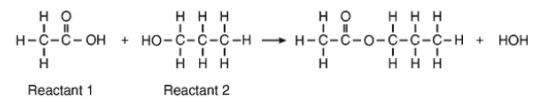


Explain, in terms of molecular formulas and structural formulas, why cyclopropane is an isomer of propene.

17

### Question 17

Many artificial flavorings are prepared using the type of organic reaction shown below.

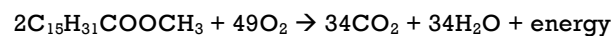


Draw the structural formula of an isomer of reactant 2.

18

### Question 18

Biodiesel is an alternative fuel for vehicles that use petroleum diesel. Biodiesel is produced by reacting vegetable oil with  $\text{CH}_3\text{OH}$ . Methyl palmitate,  $\text{C}_{15}\text{H}_{31}\text{COOCH}_3$ , a compound found in biodiesel, is made from soybean oil. One reaction of methyl palmitate with oxygen is represented by the balanced equation below.



Explain, in terms of both atoms and molecular structure, why there is no isomer of  $\text{CH}_3\text{OH}$ .

19

### Question 19

There are several isomers of  $\text{C}_6\text{H}_{14}$ . The formulas and boiling points for two of these isomers are given in the table below.

Isomer	Formula	Boiling Point at 1 atm ( $^{\circ}\text{C}$ )
1	$\begin{array}{c} \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \\   &   &   &   &   \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\   &   &   &   &   \\ \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \end{array}$	68.7
2	$\begin{array}{c} & & \text{H} & & & \\ & &   & & & \\ & & \text{H}-\text{C}-\text{H} & & & \\ & &   & & & \\ & & \text{H} & & & \\ \text{H} & & \text{H} & & \text{H} & \\   & &   & &   & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\   & &   & &   & \\ \text{H} & & \text{H} & & \text{H} & \\ & & \text{H} & & & \\ & &   & & & \\ & & \text{H} & & & \end{array}$	49.7

Write the empirical formula for isomer 1.

20

## Question 20

There are several isomers of  $C_6H_{14}$ . The formulas and boiling points for two of these isomers are given in the table below.

Isomer	Formula	Boiling Point at 1 atm (°C)
1	<pre>       H H H H H H                 H - C - C - C - C - C - H                       H H H H H H           </pre>	68.7
2	<pre>           H                     H-C-H                   H - C - C - C - H                           H H H                       H           </pre>	49.7

Explain, in terms of intermolecular forces, why isomer 2 boils at a lower temperature than isomer 1.