

Lab Instructor: \_\_\_\_\_

Name: \_\_\_\_\_

| 1,2. Structures of methane |                             |                              |
|----------------------------|-----------------------------|------------------------------|
| Three-dimensional shape    | Complete structural formula | Condensed structural formula |
|                            |                             |                              |

| 3. Structures of ethane and propane |                              |
|-------------------------------------|------------------------------|
| Ethane                              |                              |
| Complete structural formula         | Condensed structural formula |
|                                     |                              |
| Propane                             |                              |
| Complete structural formula         | Condensed structural formula |
|                                     |                              |

| 4,5,6. Structures of C <sub>4</sub> H <sub>10</sub> |                              |
|---|------------------------------|
| Butane  |                              |
| Complete structural formula                         | Condensed structural formula |
|   |                              |

| Isobutane                                |                              |
|--|------------------------------|
| Complete structural formula              | Condensed structural formula |
| <br><br><br><br><br><br><br><br><br><br> |                              |

| 7. Physical properties of isomers of C <sub>4</sub> H <sub>10</sub> |            |               |               |         |
|---|------------|---------------|---------------|---------|
| Isomer  | Molar mass | Melting point | Boiling point | Density |
| Butane  |            |               |               |         |
| 2-Methylpropane<br>(Isobutane)                                      |            |               |               |         |

|  |                              |
|--|------------------------------|
| 8. Isomers of C <sub>5</sub> H <sub>12</sub> |                              |
| Complete structural formula                  | Condensed structural formula |
| <br><br><br><br><br><br><br><br><br><br>     |                              |
| Name of above isomer:                        |                              |
| Complete structural formula                  | Condensed structural formula |
| <br><br><br><br><br><br><br><br><br><br>     |                              |
| Name of above isomer:                        |                              |
| Complete structural formula                  | Condensed structural formula |
| <br><br><br><br><br><br><br><br><br><br>     |                              |
| Name of above isomer:                        |                              |

| 8. Physical properties of isomers of C <sub>5</sub> H <sub>12</sub> |            |               |               |         |
|---|------------|---------------|---------------|---------|
| Name of isomer  | Molar mass | Melting point | Boiling point | Density |
|   |            |               |               |         |
|   |            |               |               |         |
|   |            |               |               |         |

| 9. Cycloalkanes             |                              |                   |
|-----------------------------|------------------------------|-------------------|
| Cyclopropane                |                              |                   |
| Complete structural formula | Condensed structural formula | Geometric formula |
|                             |                              |                   |
| Cyclobutane                 |                              |                   |
| Complete structural formula | Condensed structural formula | Geometric formula |
|                             |                              |                   |
| Cyclopentane                |                              |                   |
| Complete structural formula | Condensed structural formula | Geometric formula |
|                             |                              |                   |

## 11, 12. Structures of chlorinated methane

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Three-dimensional structure of  $\text{CH}_3\text{Cl}$

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Three-dimensional structure of  $\text{CH}_2\text{Cl}_2$

Are there different isomers possible for  $\text{CH}_2\text{Cl}_2$ ? Explain.

Given the structures below: are these molecules isomers or equivalent? Explain.

13, 14, 15. Structures of chlorinated ethane

Look at your model of ethane,  $\text{CH}_3\text{CH}_3$ . Are all of the hydrogen atoms equivalent? Explain.

Three-dimensional structure of  $\text{CH}_3\text{CH}_3$ 

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### Three-dimensional structure of CH<sub>3</sub>CH<sub>2</sub>Cl

Are there different isomers possible for  $\text{CH}_3\text{CH}_2\text{Cl}$ ? Explain.

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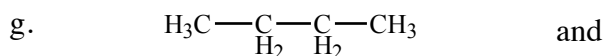
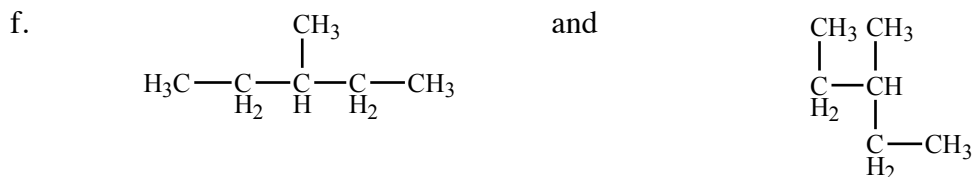
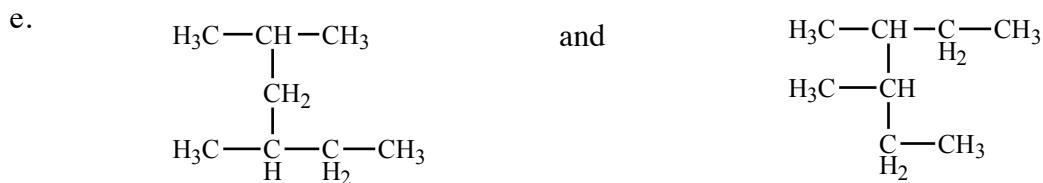
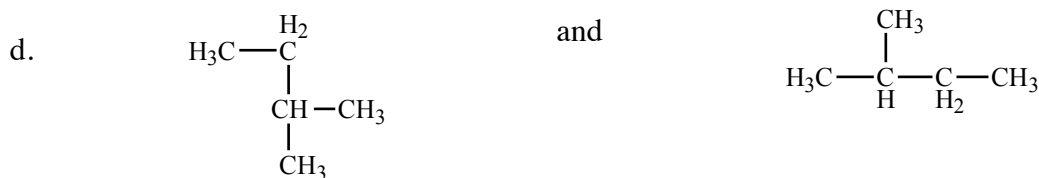
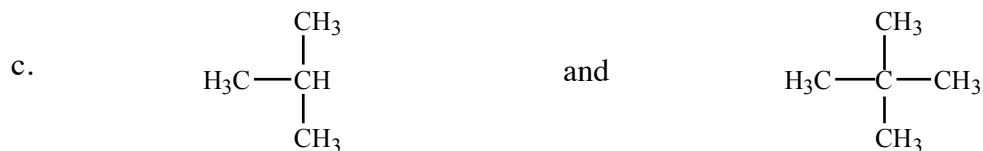
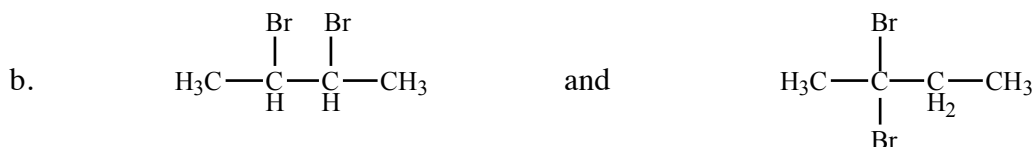
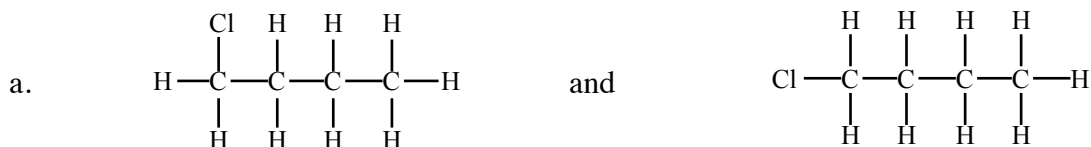
Structure of first isomer of  $\text{C}_2\text{H}_4\text{Cl}_2$

|  |                              |
|--|------------------------------|
| Three-dimensional structure                | Condensed structural formula |
| Name of above isomer:                      |                              |
| Structure of second isomer of $C_2H_4Cl_2$ |                              |
| Three-dimensional structure                | Condensed structural formula |
| Name of above isomer:                      |                              |

|   |
|---|
| 16. Models of chlorinated propane   |
| <p>How many isomers are possible for the molecular formula <math>C_3H_6Cl_2</math>?</p> <p>Draw the condensed structural formula and name each isomer.</p> <p>Make models of the molecules.</p> |

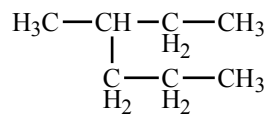
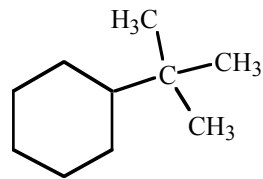
## Questions

1. For each of the following pairs of molecules, state whether they are isomers, identical, or neither. Briefly explain your reasoning in each case.



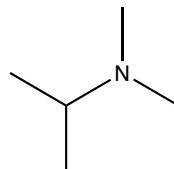
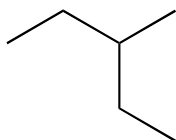
2. Name each of the molecules in question #1 above.

3. Name each of the following molecules.

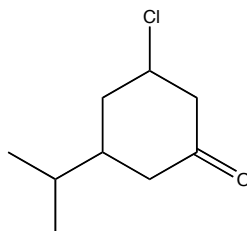
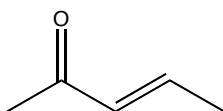


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7. Given the following line structures, draw the corresponding condensed structural formulas.







8. Given the following condensed structural formulas, draw the corresponding line structures.

