Name: $\qquad$ Date: $\qquad$
Chemistry ~Ms. Hart Class: Anions or Cations

### 12.2 Isomers - Guided Notes

SPARK:

## Blast From the Past!

31 Compared to the atoms of nonmetals in Peri 37 the atoms of metals in Period 3 have
(1) fewer valence electrons
(2) more valence electrons
(3) fewer electron shells
(4) more electron shells

Given the balanced equation representing a reaction:

$$
2 \mathrm{H}_{2}+\mathrm{O}_{2} \rightarrow 2 \mathrm{H}_{2} \mathrm{O}
$$

What is the mass of $\mathrm{H}_{2} \mathrm{O}$ produced when 10.0 grams of $\mathrm{H}_{2}$ reacts completely with $\mathrm{R} \cap \cap$ grams of $\mathrm{O}_{2}$ ?
38 Given two formulas representing the same compound:

$$
\begin{array}{cc}
\text { Formula A } & \text { Formula B } \\
\mathrm{CH}_{3} & \mathrm{C}_{2} \mathrm{H}_{6}
\end{array}
$$

Which statement describes these formulas?
70.0 g
(3) 180. g
90.0 g
(4) $800 . \mathrm{g}$

33 Which atom in the ground state requires the least amount of energy to remove its valence electron?
(1) Formulas $A$ and $B$ are both empirical.
(2) Formulas $A$ and $B$ are both molecular.
(3) Formula $A$ is empirical, and formula molecular.
(4) Formula $A$ is molecular, and formula $B$ is empirical.

## Catalyzing thoughts:

- Draw the molecule $\mathbf{C}_{\mathbf{4}} \mathbf{H}_{\mathbf{1 o}}$ below:
- Did everyone's drawing look the same? Explain:


## Isomers:

Compounds with the same molecular formula, but different structural formula:

| Butane | 2-methyl propane |
| :--- | :--- |
|  |  |
|  |  |

- Similarities:
- Differences:


## Isomer questions:

1. The compounds $\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{OCH}_{2} \mathrm{CH}_{3}$ and $\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{OH}$
(1) Hydrocarbons
(3) allotropes
(2) isomers
(4) carbohydrates
2. The compound $\mathrm{C}_{4} \mathrm{H}_{9} \mathrm{OH}$ is an isomer of
(1) $\mathrm{C}_{3} \mathrm{H}_{7} \mathrm{COCH}_{3}$
(3) $\mathrm{C}_{2} \mathrm{H}_{5} \mathrm{OC}_{2} \mathrm{H}_{5}$
(2) $\mathrm{CH}_{3} \mathrm{COOC}_{2} \mathrm{H}_{5}$
(4) $\mathrm{CH}_{3} \mathrm{COOH}$
3. If a compound has a molecular formula of $\mathrm{CH}_{2} \mathrm{O}_{2}$, then its structural formula must be
(1) $\mathrm{H}-\mathrm{O}-\mathrm{C}-\mathrm{O}-\mathrm{H}$
(3)

(2) C
$\mathrm{O}-\mathrm{H}$
(4)

4. The structural formulas

and


Represent molecules which both are
(1) halogen addition
(3) members of alkynes
(2) unsaturated hydrocarbons
(4) isomers of butane

Side Chains are one way to create isomers of hydrocarbons.
Here is how you name these hydrocarbons:
STEP 1: Find the longest chain of carbons

1) If no branches, name is easy-methane, ethane...

2) If there is a branch, the longest chain determines second part of name:

The longest chain has: $\qquad$ carbons, so the second part is: $\qquad$
STEP 2: Assign each carbon in the parent chain a number, starting with the carbon closest to the branch.


Write in numbers above each carbon in the longest chain.
STEP 3: How many carbons are in the branch?
A) Branches of alkanes are always "missing" one hydrogen.
B) The missing H is where a bond forms with a longer chain.
C) We name these branches by replacing the -ane prefix with the prefix -yl


Name of side chain: $\qquad$
STEP 4: The side chain is numbered according to what carbon they come from in the chain.


Number of side chain: $\qquad$
STEP 5: If there are more than 1 of a specific chain the prefixes di or tri etc are used. STEP 6: If there are more than two different chains they are put in alphabetical order.

## Final name:

$\qquad$
CLASSWORK

|  |
| :---: |
|  <br> Name: |
|  <br> Name: $\qquad$ |

## Draw the following structure:

2-methylbutane

## Draw the following structure:

3-ethyl,2-methylpentane

## Draw the following structure:

2,2-dimethylpropane

### 12.2 HOMEWORK

1. Compounds which have the same molecular formula but different molecular structures are called
(1) isomers
(3) allotropes
(2) isotopes
(4) homologs
2. Which compound is an isomer of $\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{OH}$ ?
(1) $\mathrm{CH}_{3} \mathrm{CHO}$
(2) $\mathrm{CH}_{3} \mathrm{COCH}_{3}$
(3) $\mathrm{CH}_{3} \mathrm{OCH}_{3}$
(4) $\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{COOH}$
3. Which compound is an isomer of $\mathrm{CH}_{3} \mathrm{COOCH}_{3}$ ?
(1) $\mathrm{CH}_{3} \mathrm{OCH}_{3}$
(2) $\mathrm{CH}_{3} \mathrm{COCH}_{3}$
(3) $\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{COOH}$
(4) $\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{OH}$
4. Which compound is an isomer of $\mathrm{CH}_{3} \mathrm{COOH}$ ?
(1) $\mathrm{HCOOCH}_{3}$
(2) $\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{COOH}$
(3) $\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{OH}$
(4) $\mathrm{CH}_{3} \mathrm{COOCH}_{3}$

Name the following:

|  | b) |  |
| :---: | :---: | :---: |

Draw the following structural formulas:

| 2-methyl butane | 3-ethyl,2-methylpentane | 2,4dimethylhexane |
| :--- | :--- | :--- |
|  |  |  |

## Review:

Which formula may represent an unsaturated hydrocarbon?
(1) $\mathrm{C}_{2} \mathrm{H}_{6}$
(3) $\mathrm{C}_{3} \mathrm{H}_{6}$
(2) $\mathrm{C}_{4} \mathrm{H}_{10}$
(4) $\mathrm{C}_{5} \mathrm{H}_{12}$

Which is a saturated hydrocarbon?
(1) $\mathrm{C}_{3} \mathrm{H}_{8}$
(3) $\mathrm{C}_{6} \mathrm{H}_{6}$
(2) $\mathrm{C}_{2} \mathrm{H}_{5} \mathrm{OH}$
(4) $\mathrm{C}_{2} \mathrm{H}_{4} \mathrm{O}_{2}$

The compound $\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{CH}_{3}$ belongs to the series that has the general formula
(1) CnH2n-2
(3) $\mathrm{CnH} 2 \mathrm{n}+2$
(2) $\mathrm{CnHn}-6$
(4) $\mathrm{CnHn}+6$

