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# Alkane Resources Activity Project Notebook

## Assign Roles for Team Partners:

**Captain:** \_\_\_\_\_

Captain reports any information to the teacher and keeps the team moving at the assigned pace.

**Recorder:** \_\_\_\_\_

Recorder writes responses to all team activities once the team agrees on their responses.

**Technologist:** \_\_\_\_\_

Technologist opens assigned web pages on their own device and makes sure everyone can see and interact with the web pages together.

## Day 1: Problem-Finding

### Consider your own background experience to answer these two questions:

What problems can we solve by using renewable resources?

Can most cars currently use renewable fuel? Why or why not?

### Use the presentation slides and this [video from CISTAR](#) to answer these questions:

How much oil is used for transportation each day in the USA?

What percent of transportation fuel currently comes from oil?

What percent of chemicals, including plastics, comes from oil?

What percent of transportation fuel and chemicals do we want to replace with renewable sources?

How long will it take to develop the technology to completely convert to renewable fuels?

What resource found in the USA can replace imported oil?

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How long is that resource projected to last?

Which light hydrocarbons are found in shale gas? Write their chemical formulas here.

What two main products are obtained by processing shale gas?

Which reaction will we be looking at during this project?

**Evaluate your own current understanding of the problem: Light shale gases like ethane need to be converted into fuels and petrochemicals. How can that be done?**

What do you *KNOW* about this problem?

What do you *NEED TO KNOW* about this problem?

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**Project Vocabulary:** Discuss with your team the main differences, if any, between the meanings for these words that you wrote on your pre-assessment and their actual definition provided in the Project Glossary above. Then score each word from 1-3 for level of understanding.

- 1 – No understanding of this word
- 2 – Some understanding of this word
- 3 – Complete understanding of this word

Level of Understanding	
	element
	compound
	chemical reaction
	hydrocarbon
	alkane
	monomer
	oligomerization
	renewable resource
	nonrenewable resource

### Alkanes

Alkanes are compounds that contain only carbon and hydrogen atoms, so they are in a larger class of chemical compounds called hydrocarbons. Alkanes only have single bonds between carbon atoms. Other types of hydrocarbons may also contain double or triple bonds between carbon atoms. The bonds between carbon and hydrogen are always single bonds.

## Day 2: Investigating Hydrocarbons

Each group has been assigned an alkane compound to investigate using WebMO.

Name of your alkane: \_\_\_\_\_

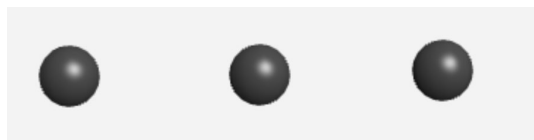
Chemical formula of your alkane: \_\_\_\_\_

How many carbon atoms are in your alkane? \_\_\_\_\_

How many hydrogen atoms are in your alkane? \_\_\_\_\_

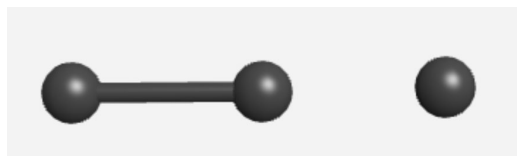
Create a model of your alkane using WebMO.

1. Go to WebMO Demo Server: <https://www.webmo.net/demoserver/cgi-bin/webmo/login.cgi>
2. Log in with these credentials:
  - i. Username: **guest**
  - ii. Password: **guest**
3. Type <enter>
4. Across the top should read "New Job", "Refresh", "Download", etc.
5. Select "New Job".
6. Click "Create New Job". This will go to the "Build Molecule" page.
7. Click the blank screen once for each carbon atom in the molecule.
8. Move the cursor between clicks so the carbon atoms are in a line.



Image(s) created with WebMO software, [www.webmo.net](http://www.webmo.net)

9. Draw a chemical bond between each of the atoms: Click and hold the cursor on the first atom and drag the cursor to the next atom. Control-Z will reverse any mistakes.



Image(s) created with WebMO software, [www.webmo.net](http://www.webmo.net)

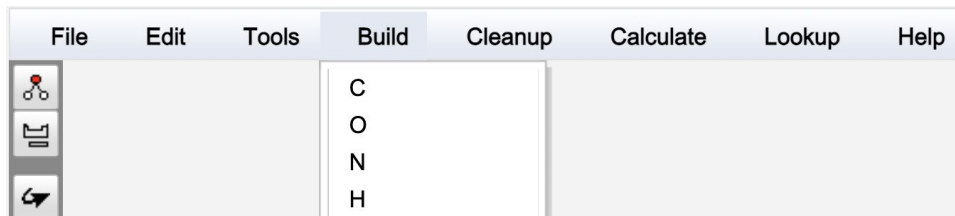
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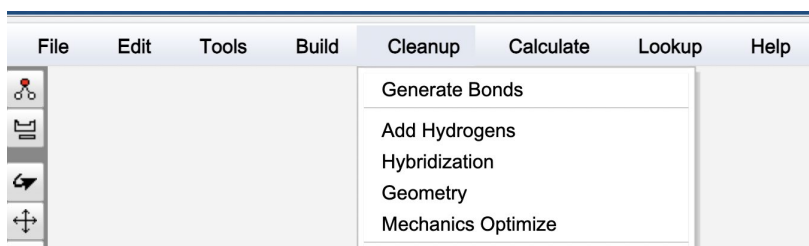
10. Select "Build", then select H for hydrogens.

11. Click the blank screen once for each hydrogen atom, spreading them evenly around the carbon atoms.



12. Draw a chemical bond between each hydrogen and the nearest carbon atom.

13. Under "Cleanup", select "Geometry" to correct the shape of your molecule.



14. Under "Lookup", select "Molecule Info" and record the following information about your molecule:

**Stoichiometry:**

**IUPAC Name:**

**Molar Mass:**



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5. Set up the models with an arrow from the starting products to the ending products. When complete, check your reaction model using the rubric below.

[Reactants] --> [Products]

<b>Gumdrop Reaction Rubric</b>	<b>No (0 points)</b>	<b>Sort of (1 point)</b>	<b>Yes (2 points)</b>
The reactants are clearly on the left side of the arrow and the products are clearly on the right.			
Ethylene and butylene molecules are depicted with one double bond (two toothpicks between atoms)			
The reactants contain one or more ethylene molecules, and the products contain one or more butylene molecules			
Both sides of the reaction have the same number of hydrogen atoms			
Both sides of the reaction have the same number of carbon atoms			

Total Score: \_\_\_\_\_

6. Correct your reaction model until it has a score of at least 8 points before your captain asks me to come check it.
7. Take a photo of your model reaction and add it here if using this worksheet digitally.