

Use *Hydrocarbon explorer* to help answer the following questions.

1. Create a model of methane. Draw a 2-D diagram of this molecule showing all bonds.

2. Look at the **Ball & stick** and **Space fill** models of methane. Draw a diagram of each of these 3-D representations. You may choose to spin them around on the screen.

3. List advantages of these different views.

2-D model: .....

3-D ball and stick: .....

3-D space fill: .....

4. Create a model of propane. Using the **Ball & stick** view, observe the size of the angle between the carbon bonds. Measure this angle by double-clicking on the first carbon atom, single-clicking on the second carbon atom, then double-clicking on the third carbon atom.

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5. Change one of the single bonds to a double bond, to make propene. How has the angle between carbon atoms changed? You may need to rotate the model for a clear comparison.

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6. Now change the double bond to a triple bond, to make propyne. How does this change the carbon-carbon angle?

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7. What trend do you observe?

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8. Why does this happen?

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9. Can you name the following molecules? Use *Hydrocarbon explorer* to check your answers.

$\text{CH}_3\text{—CH}_2\text{—CH}_2\text{—CH}_2\text{—CH}_3$	
$\text{CH}_2\text{=CH—CH}_2\text{—CH}_3$	
$\text{CH}_3\text{—CH=CH—CH}_3$	
$\text{CH}\equiv\text{C—CH}_2\text{—CH}_2\text{—CH}_2\text{—CH}_2\text{—CH}_3$	
$\text{CH}_2\text{=CH—CH=CH—CH}_3$	
$\text{CH}_2\text{=C=C=C=CH}_2$	
$\text{CH}\equiv\text{C—C}\equiv\text{C—C}\equiv\text{CH}$	