BURNING A HYDROCARBON I

NAME

SECTION

Problem Statement: How are masses of reactants and products related?

I. Data Collection

A. Go to http://cheminfo.chem.ou.edu/~mra/home.html and open the Burning a Hydrocarbon I Simulation. Your screen should look like the figure below.

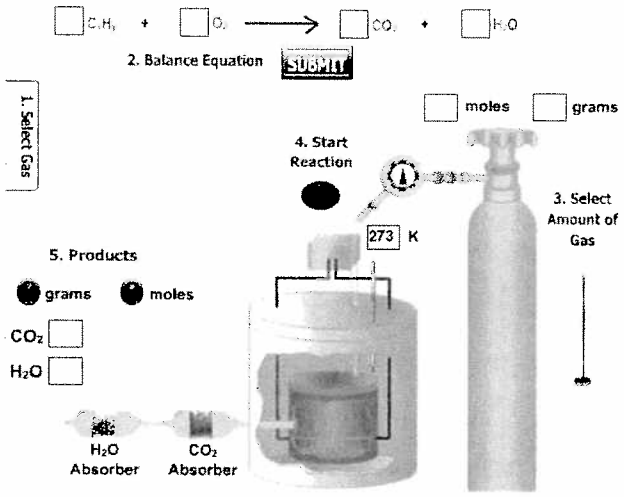

Figure 1.

The apparatus represents a reaction container that can be filled with different amounts of hydrocarbon gases from a gas cylinder. A hydrocarbon is a chemical substance containing only hydrogen and carbon. When hydrocarbons combine with oxygen, (i.e. burn), they produce carbon dioxide and water as products. The reaction container will also hold oxygen gas to react with the hydrocarbon. To use the simulation you must (1) select a gas by clicking on the select tab, (2) balance the chemical equation and submit it, (3) specify the amount of gas with a slide bar, (4) start the reaction, and (5) examine the amount of products. These steps are numbered in the simulation.

B. Click on the Select Gas tab and pick CH_4, methane. Balance the equation using the lowest ratio of whole numbers and submit the equation. Add 10.0 g of CH_4 to the reaction container and start the reaction. The simulation will burn the gas and pass the products through filters that will absorb the product molecules so that they can be weighed. Click on the Product button. Record the data you collected in the following tables.

	___CH_4 +	___O_2 →	___CO_2 +	___H_2O
Initial Amount (moles) – I		—		
Change (moles) – C				
Ending Amount (moles) – E		—		

Initial Amount (grams) – I		—		
Change (grams) – C				
Ending Amount (grams) – E		—		

C. Calculate the change in the number of moles and grams that occurred when the reaction was complete. Record your results in the tables above.

II. Data Analysis and Interpretation

A. What must you assume about the amount of oxygen present in the reaction container at the beginning of the reaction to account for your observations?

B. How do you know that all of the CH_4 reacted when the reaction was complete?

C. Compare the total mass of the compounds that reacted with the total mass of the products that was formed.

D. Compare the balanced equation to the data in the tables. Which data best describes the relationships represented by the balanced equation?

III. Data Collection

A. Click on the Select Gas tab and pick C_2H_6, ethane. Balance the equation using the lowest ratio of whole numbers and submit the equation. Add 10.0 g of C_2H_6 to the reaction container and start the reaction. Click on the Product button. Record the data you collected in the following tables.

	___C_2H_6 +	___O_2 →	___CO_2 +	___H_2O
Initial Amount (moles) – I		—		
Change (moles) – C				
Ending Amount (moles) – E		—		

Initial Amount (grams) – I		—		
Change (grams) – C				
Ending Amount (grams) – E		—		

B. Calculate the change in the number of moles and grams that occurred when the reaction was complete. Record your results in the tables above.

IV. Data Analysis and Interpretation

A. Compare the total mass of the compounds that reacted with the total mass of the products that was formed. Is mass conserved?

B. Compare the total number of moles of the compounds that reacted with the total number of moles of the products that were formed. Is number of moles conserved?

V. Data Collection

A. Consider burning 10.0 g C_3H_8, propane. Balance the following equation using the lowest ratio of whole numbers. Before trying the experiment, predict the amounts of reactants and products and fill in the tables below.

	___C_3H_8 + ___O_2 → ___CO_2 + ___H_2O			
Initial Amount (moles) – I		—		
Change (moles) – C				
Ending Amount (moles) – E		—		

Initial Amount (grams) – I		—		
Change (grams) – C				
Ending Amount (grams) – E		—		

B. Test your predictions using the simulation. Correct any values in the table.

VI. Conclusions

A. Compare the total mass of the compounds that reacted with the total mass of the products that were formed. Is mass conserved?

B. Compare the total number of moles of the compounds that reacted with the total number of moles of the products that were formed. Is number of moles conserved?

C. Click on the Select Gas tab and pick unknown hydrocarbon C_xH_y. Add 10.0 g of C_xH_y to the reaction container and start the reaction. Click on the Product button. Record the data you collected in the following tables.

	___C_xH_y +	___O_2 →	___CO_2 +	___H_2O
Initial Amount (grams) – I		—		
Change (grams) – C				
Ending Amount (grams) – E		—		

Initial Amount (moles) – I		—		
Change (moles) – C				
Ending Amount (moles) – E		—		

D. Determine possible values for x and y. Balance the equation using the resulting hydrocarbon.

___ ___ + ___O_2 → ___CO_2 + ___H_2O