

## The Fuel in a Bic<sup>®</sup> Lighter

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

Section: \_\_\_\_\_

Date: \_\_\_\_\_

### DATA

Barometric pressure: \_\_\_\_\_ torr

Experimental data	Trial 1	Trial 2	Trial 3	Trial 4
Mass (g) of hydrocarbon				
Volume (L) of hydrocarbon				
Volume (L) of hydrocarbon at STP				
Mass $\times$ Vol (STP)				
Mass $\div$ Vol (STP)				
Water bath temperature ( $^{\circ}$ C)				
Water bath temperature (K)				
Vapor pressure of water at water bath temperature (torr)				
Partial pressure of the hydrocarbon gas (torr)				
Partial pressure of the hydrocarbon gas (atm)				
Molar mass (g/mol)				
Molar mass at STP				
Average molar mass				

Show calculations for one trial (use units and make sure that units cancel out):

Volume at STP:

Molar mass:

Molar mass at STP:

## Post Lab Questions

1. What pattern do you find between the volume and mass data? Hint: Look at the different two mathematical operations ( $\times$  and  $\div$ ) above. Do any of the operations yield a value that is nearly constant? Briefly explain why (pay attention to its units).

2. How do the molar masses calculated at experimental temperature and pressure compare to molar masses calculated at STP. Explain your answer.

3. Given the formula of butane,  $C_4H_{10}$ , does your average molar mass approximately equal the molar mass of butane? Is your value closer to that of propane ( $C_3H_8$ )?

4. Based on your answer to question #3 above, which other hydrocarbons listed below could be mixed with butane to give the average molar mass determined?

$CH_4$  (methane),  $C_2H_6$  (ethane),  $C_3H_8$  (propane),  $C_4H_{10}$  (butane),  $C_5H_{12}$  (pentane),  $C_6H_{14}$  (hexane),  $C_7H_{16}$  (heptane),  $C_8H_{18}$  (octane)

5. What is the accuracy of your findings? Find the % deviation (error) of your experimental molecular mass from the accepted molecular mass of butane.