Chemistry 30B **Experiment 5**

Lab Instructor:_____ Name:_____

Part 1: Structures of Hydrocarbons

Name of Compound	**Condensed Structural Formula**
Ethylene	
Propene	
Cis-2-butene	
Trans-2-butene	
Acetylene (ethyne)	

Part 2: Combustion

Substance	**Observations of Combustion**
Hexane	
Toluene	
Cyclohexene	

Part 3: Solubility

Substances mixed	Observations	Which liquid is on top?
Hexane and water		
Hexane and toluene		

Part 4: Volatility

Substance	Evaporation start time	Evaporation end time	Total time needed for evaporation	Boiling point
Pentane				
Heptane				

Part 5: Reaction with Bromine

Substance	Observations when Br_2 added	Positive or negative rxn?	If negative: observations with UV light
Hexane			
Cyclohexene			
Toluene			
Unknown # ?			

Part 6: Reaction with $KMnO_4$

Substance	Observations when $KMnO_4$ added	Positive or negative rxn?
Hexane		
Cyclohexene		
Toluene		
Unknown # ?		

Questions

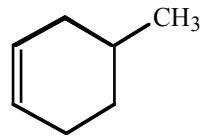
1. An unknown compound is found to burn in oxygen. When bromine is added to this unknown, the solution remains orange. What can be said about the unknown compound?

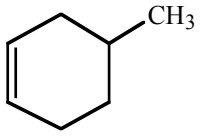
2. When a purple solution of $KMnO_4$ is added to a different unknown, a brown precipitate forms. What can be said about this unknown?

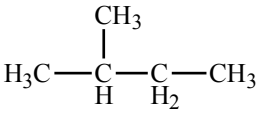
3. Discuss the differences between the bromination of an alkene and the bromination of an alkane.

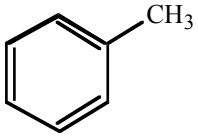
4. Would 2-butene be more soluble in cyclohexane or in water? Explain.

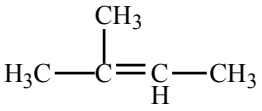
5. Complete the following reactions and name the organic reactants and product(s). If no reaction occurs, write "NR".

a.  + Br_2 ⟶

b.  + $KMnO_{4\,(aq)}$ ⟶

c.  + Br_2 $\xrightarrow{\text{UV light}}$

d.  + Br_2 $\xrightarrow{\text{UV light}}$

e.  + Br_2 ⟶

6. When n-butane is reacted with bromine in the presence of UV light, many products are possible. Write the condensed structural formulas of **six** of the many possible products.

7. Complete and balance the following combustion reactions. (You will need to determine the molecular formulas of the reactants.)

   a. pentane + O_2 →

b. toluene + O_2 →

c. 2-butene + O_2 →