

Sample Student Intermolecular Forces Activity Handout

Group Members: _____

Part I – Magnet Boxes

Substance	Box	Rationale
HCl		
$ \begin{array}{cccccccccccc} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \\ & & & & & & & & & & & \\ \text{H} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{H} \\ & & & & & & & & & & & \\ & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \end{array} $		
Water, H ₂ O		
Ammonia, NH ₃		
$ \begin{array}{cccccccc} & \text{H} & \text{OH} & \text{H} & \text{OH} & \text{H} & \text{OH} & \text{H} & \\ & & & & & & & & \\ \text{H} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{H} \\ & & & & & & & & \\ & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \end{array} $		
$ \begin{array}{cccc} & \text{H} & \text{H} & \text{O} & \text{H} & \\ & & & & & \\ \text{H} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{H} \\ & & & & & \\ & \text{H} & \text{H} & & \text{H} & \end{array} $		
$ \begin{array}{ccc} & \text{H} & \text{H} & \text{H} & \\ & & & & \\ \text{H} & -\text{C} & -\text{C} & -\text{C} & -\text{H} \\ & & & & \\ & \text{H} & \text{H} & \text{H} & \end{array} $		

Part II – Electron Density Maps

$\begin{array}{c} \text{Cl} \\ \\ \text{H}-\text{C}-\text{H} \\ \\ \text{H} \end{array}$ _____	$\text{CH}_3\text{CH}_2\text{CH}_2\text{—OH}$ _____
$\text{CH}_3\text{CH}_2\text{—O—CH}_3$ _____	H—Br _____
$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ _____	$\begin{array}{c} \text{O} \\ \\ \text{CH}_3-\text{C}-\text{CH}_3 \end{array}$ _____

Part III – Boiling Point Analysis

Test Tube	Experimental boiling point (°C)
A	
B	
C	

Rank the liquids by their intermolecular forces.

Liquid with weakest IMFS = _____

Liquid with strongest IMFS = _____

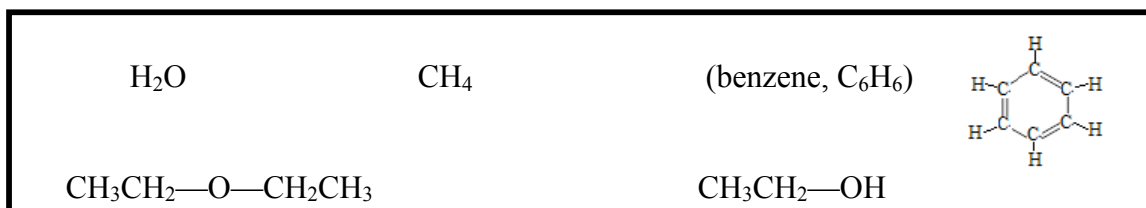
Justify your ranking system. How did you choose the order?

Post-Activity Questions

1. The heats of vaporization for five substances are provided in the table. Using this information and the list of possible identities, identify each substance.

Substance	Heat of Vaporization (kJ/mol)
1	9.2
2	31.0
3	39.3
4	26.0
5	40.8

Possible identities:



Substance 1 = _____

Substance 2 = _____

Substance 3 = _____

Substance 4 = _____

Substance 5 = _____

2. Justify your answer to Question #1, and explain your reasoning in ranking them the way you did.
3. On a scale of 1-10, with 1 being “not confident” and 10 being “very confident,” please rate your confidence level with regards to your ability to answer the questions about intermolecular forces *correctly* on upcoming exams. If you and your partner have differing opinions, please include both of them.