ROSEDALE ACADEMY

Name_____

2-3:Properties of Organic Compounds Lab (32 marks)

Equipment:

- safety goggles
- lab coat
- gloves
- beakers
- thermometers
- hot plate

Materials

Liquids:

- pentane
- hexane
- heptane
- octane
- 2-propanol
- propanal
- propanone
- ethyl methoanoate
- propanoic acid
- methoxyethane
- oil
- ethanol
- 1-pentanol
- 1-decanol
- methoxymethane
- propanoic acid
- propyl ethanoate
- propanamine

Procedure:

Boiling Points:

1. Put on lab coat, goggles and gloves
2. Under the fumehood, pour 50 mL of each solution into a labeled beaker
3. Insert a thermometer into each beaker
4. Place the beakers, one at a time on to the hot plate
5. Wait for the solution to begin boiling and record the temperature that it boils at
6. Remove the beaker from the hot plate and keep it under the fumehood to cool down

Solubility

1. To test the solubility of each sample in water, pour the sample into a beaker of water and observe how the two solutions mix with each other
2. Use the solubility chart posted on the lab wall to determine the solubility of each sample in water

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Observations & Results (5 marks)

1. Alkane Boiling Point Trends

Molecular Formula	Hydrocarbon Name	Boiling Point (°C)
C_5H_{12}		
C_6H_{14}		
C_7H_{16}		
C_8H_{18}		

2. Organic Compound Boiling Points

Compound Name	Total Number of Carbons	Boiling Point (°C)
Propane	3	-42
2-Propanol		
Propanal		
Propanone		
Ethyl methanoate		
Propanoic Acid		
Methoxyethane		

3. Organic Compound Solubility

Compound Name	Total Number of Carbons	Solubility in Water
Oil	----------	Insoluble
Ethanol		
1-pentanol		
1-decanol		
methoxymethane		
Propanoic Acid		
Propyl ethanoate		
Propanamine		

3. Amine Boiling Points

Compound Name	Total Number of Carbons	Boiling Point (°C)
Propanamine		
N-methylethanamine		
N,N-dimethylethanamine		

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Boiling Points (15 marks total):

2a) What is the relationship between the number of carbons in an alkane and boiling point? **(1 mark)**

2b) Explain how intermolecular forces affect this trend. **(2 marks)**

3a) How does the boiling point of an alcohol compare to the boiling point of a hydrocarbon with the same number of carbons? **(1 mark)**

3b) Explain the reason for this difference (consider structure, polarity and intermolecular forces). **(2 marks)**

4a) How does the boiling point of an ether compare to the boiling point of an alcohol with the same number of carbons? **(1 mark)**

4b) Explain the reason for this difference: **(2 marks)**

5a) How do the boiling points of aldehydes, ketones, alcohols and hydrocarbons compare when they have the same or similar numbers of carbons? **(1 mark)**

5b) Explain the reasons for these differences. **(2 marks)**

5a) For the three different amines in this experiment, how does the number of hydrogen atoms bound to the nitrogen affect the boiling point? **(1 mark)**

5b) Explain this trend. **(2 marks)**

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Solubility (12 marks total):

1. What allows some organic compounds to be soluble in water? **(2 marks)**

2. If two solutions are insoluble with each other, describe how a mixture of the two solutions would appear. **(1 mark)**

3. Explain the saying "like dissolves like" **(2 marks)**

4. What is the trend in solubility for alcohols in water as the number of carbons in the parent chain increases. Explain this trend? **(3 marks)**

5. Which of the following would be the most soluble and least soluble in water: Primary amines, secondary amines, tertiary amines. Explain your reasoning. **(2 marks)**

6. Would you expect an alcohol with a 20-carbon parent chain to be soluble or insoluble in oil? Why? **(2 marks)**