Physical Properties of Organic Compounds

SCH4U | Student laboratory assignment | 1 of 4

Prepare for your investigation

Name: _____ Date: _____ Class: _____

Research question

How do functional groups, molecular structure and intermolecular forces influence the boiling points and solubilities of organic compounds?

Learning goal: use the virtual model to gather evidence, explain physical properties of organic compounds and communicate a supported conclusion.

Materials: WorksheetGalaxy virtual laboratory, this assignment, calculator or spreadsheet if needed. Virtual observations only; do not recreate hazardous procedures or perform physical fitness tests without teacher approval.

1. Define two relevant scientific terms from the Background Information tab. (K/U)

2. Write a prediction or hypothesis with a scientific reason. (K/U, T/I)

3. Identify the variable or feature compared, the measured outcome and constants or consistent observation criteria. (T/I)

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Perform the virtual laboratory

Open the corresponding virtual lab and read Background Information. Follow the investigation instructions below. Record authentic simulated results; do not invent data.

Part A — Boiling points

• Record boiling points for at least six compounds.

• Include at least one structural isomer pair and at least two functional-group families.

• Compare compounds with similar molar masses, identifying the dominant IMFs.

• Generate a boiling-point graph and describe two supported trends.

Part B — Solubility

• Test at least six compounds in water and in the model nonpolar solvent (hexane).

• Record the predicted qualitative outcomes and compare them with structural features.

• Explain why the presence of an –OH group does not guarantee unlimited water solubility.

Report requirements

• Complete a hypothesis, identify variables, provide recorded observations and graph, answer the analysis prompts, discuss limitations, and write a conclusion supported by data.

Record each completed observation using the simulator’s record control when available. Use Data & Graphs to review results. Export CSV if available; attach additional rows or screenshots when needed.

Record the exact settings and any changes to the method.

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Observations & results

Enter the actual results. Keep trial IDs consistent between continued tables. Attach the full exported data or extra sheets when the procedure requires more rows. Include units as displayed.

Data table 1

Trial / item	Compound	Formula	Family	Molar mass (g/mol)	Boiling point (°C)

Data table 1 — continued (2)

Trial / item	Action

Data table 2

Trial / item	Compound	Solvent	Simulated observation	Action

Qualitative observations / sample calculation (show units where applicable)

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Analysis, conclusion & assessment

4. Present a labelled graph of a measured relationship, or an annotated diagram / comparison chart for qualitative investigations. Attach it separately. Explain the pattern using recorded evidence. (C, T/I)

5. Analysis — explain boiling-point trends using intermolecular forces and molecular structure (K/U, A)

6. Analysis — compare one structural isomer pair and one functional-group isomer pair (K/U, A)

7. Analysis — explain the solubility outcomes and the effect of hydrocarbon chain length (K/U, A)

Conclusion and evaluation: answer the research question, revisit the prediction using evidence, identify a model limitation and propose an improvement. (T/I, A)

Submit this assignment plus your completed Lab Report (printed or saved as PDF from the lab) and any supporting data/figures.

K/U: accurate concepts /10	T/I: method, data, reasoning /12	C: clear tables, units, report /8	A: explanation, conclusion, transfer /10

Total: /40