Percentage Water in a Hydrate

SCH4C | Student laboratory assignment | 1 of 4

Prepare for your investigation

Name: _____ Date: _____ Class: _____

Research question

How can mass measurements before and after heating be used to determine the percentage of water and formula of a hydrate?

Learning goal: use the virtual model to gather evidence, explain percentage water in a hydrate 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.

• Write a hypothesis predicting what happens to mass and colour during heating.

• Record the mass of the empty crucible and the initial mass of crucible plus hydrate.

• Heat the sample, cool it, and record the combined mass. Repeat until consecutive cooled masses differ by no more than 0.01 g .

• Complete at least three independent trials, resetting the apparatus between trials.

• Calculate hydrate mass, anhydrous salt mass, water lost, percentage water, moles of $CuSO_4$, moles of H_2O, and their ratio.

• Compare your experimental percentage with 36.08%. Identify at least two sources of error and explain the direction of their effects.

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	Hydrate (g)	Anhydrous (g)	Water (g)	Water (%)	H_2O:$CuSO_4$

Data table 1 — continued (2)

Trial / item	Cycles

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 1 — Constant Mass (K/U, A)

6. Analysis 2 — Sources of Error (K/U, A)

7. Analysis 3 — Experimental Formula (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