Percentage Yield: Steel Wool and Copper(II) Sulfate

SCH3U | Student laboratory assignment | 1 of 4

Prepare for your investigation

Name: _____ Date: _____ Class: _____

Research question

How do the starting masses of iron and copper(II) sulfate affect the theoretical yield and percentage yield of copper?

Learning goal: use the virtual model to gather evidence, explain percentage yield: steel wool and copper(ii) sulfate 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 balanced molecular equation and identify oxidation and reduction.
- Predict the limiting reactant for each trial before running it.
- Run at least four trials : two with iron limiting and two with copper(II) sulfate limiting.
- Record initial masses, recovered copper mass, theoretical yield, and percentage yield.
- Investigate how collection efficiency and sample dryness influence measured yield.
- Complete the report with calculations, uncertainty, discussion, and conclusion.

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	Fe (g)	$CuSO_4$ (g)	Limiting	Theoretical Cu (g)	Measured Cu (g)

Data table 1 — continued (2)

Trial / item	Yield (%)

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. Compare two contrasting observations from your investigation of Percentage Yield: Steel Wool and Copper(II) Sulfate. Explain the difference using the background information. (K/U, A)

6. Use a specific recorded result to answer the research question. Explain the scientific reasoning behind it. (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