Determination of the Equilibrium Constant, K c

SCH4U | Student laboratory assignment | 1 of 4

Prepare for your investigation

Name: _____ Date: _____ Class: _____

Research question

How can spectrophotometry be used to determine the equilibrium constant for formation of $FeSCN^{2+}$?

Learning goal: use the virtual model to gather evidence, explain determination of the equilibrium constant, k c 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.

- Read the background and write a hypothesis about absorbance versus complex concentration.
- Measure at least four calibration standards with known $FeSCN^{2+}$ concentrations.
- Generate the calibration graph and identify its slope.
- Prepare and measure at least three equilibrium mixtures with different starting concentrations.
- Use the calibration to calculate x, equilibrium concentrations, and K c for each mixture.
- Calculate mean K c , explain variations, evaluate limitations, and submit the completed lab report.

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	Standard	[$FeSCN^{2+}$] (mol/L)	Absorbance

Data table 2

Trial / item	$[Fe^{3+}]_0$	$[SCN^-]_0$	A	$[FeSCN^{2+}]eq$	$[Fe^{3+}]eq$

Data table 2 — continued (2)

Trial / item	$[SCN^-]eq$	Kc

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 Determination of the Equilibrium Constant, K c. 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