Atomic Structure & Bohr–Rutherford Diagrams

SNC1W | Student laboratory assignment | 1 of 4

Prepare for your investigation

Name: _____ Date: _____ Class: _____

Research question

How can observations from this virtual investigation explain atomic structure & bohr–rutherford diagrams?

Learning goal: use the virtual model to gather evidence, explain atomic structure & bohr–rutherford diagrams 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.

• Predict and build neutral carbon-12, oxygen-16, sodium-23 and calcium-40.

• For each, record proton, neutron and electron counts, net charge and shell arrangement.

• Compare carbon-12 with carbon-14. Explain which particle count changes.

• Compare neutral sodium with Na^{+} and neutral chlorine with Cl^{-}. Explain electron transfer and resulting charge.

• Use the identification challenge to test element and ion knowledge.

• Save at least six trials, analyze your results and complete the lab report.

• Variables: independent—number of protons, neutrons or electrons; dependent—element identity, mass number, charge and shell occupancy; controlled—same introductory shell model.

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	Element	Protons	Neutrons	Electrons	Mass no.

Data table 1 — continued (2)

Trial / item	Charge	Shells

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. Describe your observations for four neutral atoms. (K/U, A)

6. Explain the difference between carbon-12 and carbon-14. (K/U, A)

7. Explain how sodium becomes Na^{+} and chlorine becomes Cl^{-}. (K/U, A)

8. Compare electron shell arrangements for oxygen and calcium. (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