

Grade 9 Unit 4 Quiz: Electrons and Periodicity

Shell models, families, trends, and evidence

Name: _____

Date: _____

Time: 25–30 minutes. **Tools:** calculator optional. Treat shell diagrams and trend arrows as models: use them to explain a pattern, then state an appropriate limit.

1. An atom has shell arrangement 2,8,3. How many valence electrons does it have, and what likely common ion charge follows from losing its valence electrons? [2 pts]

2. Write the shell arrangement for neutral sulfur, which has 16 electrons. [1 pts]

3. An ion has 17 protons and 18 electrons. Write its charge and explain the sign. [2 pts]

4. Name the periodic-table family for Group 17. State its common simple ion charge and connect that charge to a valence-electron pattern. [2 pts]

5. Which atom has a larger atomic radius: Na or Cl? Use an across-period trend and a cause-based explanation. [2 pts]

6. Which atom more easily loses one electron: K or Br? Give a periodic-trend reason and one limit on this prediction. [2 pts]

7. Four consecutive elements have first-ionization data 500, 740, 900, and 860 kJ/mol. Describe the overall pattern and identify which point deserves further investigation. [2 pts]

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8. A student draws electrons as colored circles moving on fixed circular tracks. Give one useful idea the drawing communicates and one way it could mislead. [2 pts]

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9. A data table gives reaction-score values 2, 5, and 9 for three Group 1 elements in order down the group. Write a claim-evidence-reasoning statement that is cautious about cause. [3 pts]

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10. An unfamiliar element is in Group 2 and Period 4. Predict a likely simple ion charge and the number of occupied shells in the shell model. Explain why neither prediction describes every possible compound. [2 pts]
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