Periodic Trends — Answer Key

Instructor reference • Worked solutions in red

Explanations use introductory chemistry conventions. Equivalent valid structures or correctly rounded numeric answers may also receive credit.

1. Which element has the larger atomic radius: Na or Cl? Explain using an appropriate trend.

Na. Across period 3, effective nuclear charge generally increases to the right, drawing electrons closer.

2. Which element has the larger atomic radius: Li or Cs? Explain using an appropriate trend.

Cs. Down group 1, outer electrons occupy shells farther from the nucleus.

3. Which element has the larger atomic radius: Mg or S? Explain using an appropriate trend.

Mg. Within period 3, radius generally decreases toward the right.

4. Which element has the larger atomic radius: F or I? Explain using an appropriate trend.

I. Iodine has more occupied electron shells than fluorine.

5. Which element has the larger atomic radius: N or P? Explain using an appropriate trend.

P. Phosphorus is one period below nitrogen.

6. Which element has the larger atomic radius: Na or K? Explain using an appropriate trend.

K. Potassium is below sodium in group 1.

7. Which element has the higher first ionization energy: Na or Cl? Explain using an appropriate trend.

Cl. First ionization energy generally rises left to right across a period.

8. Which element has the higher first ionization energy: K or Li? Explain using an appropriate trend.

Li. Valence electrons in lithium are held more tightly than those in potassium.

9. Which element has the higher first ionization energy: Mg or S? Explain using an appropriate trend.

S. Sulfur has a higher first ionization energy than magnesium; trends have exceptions but not in this pair.

10. Which element has the higher first ionization energy: C or F? Explain using an appropriate trend.

F. Across period 2, first ionization energy generally increases.

11. Which element has the higher first ionization energy: Ca or Sr? Explain using an appropriate trend.

Ca. Down group 2, the first ionization energy decreases.

12. Which element has the higher electronegativity: P or Cl? Explain using an appropriate trend.

Cl. Chlorine attracts bonding electrons more strongly than phosphorus.