Chapter 02 Test Bank KEY

1. Visible light, radio waves, microwave radiation, infrared, ultraviolet radiation, X-rays, and gamma rays all constitute the electromagnetic spectrum. Which of the following characteristics do all of these kinds of radiation share?

A. They all have the ability to generate heat in objects.
B. They all have the same frequencies.
C. They are all the transmission of energy in the form of waves.
D. They have equal energies.
E. They have the same electron spin state.

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Electromagnetic Radiation (Wave Properties)
Topic: Quantum Theory and Atomic Structure

2. Select the arrangement of electromagnetic radiation which starts with the shortest wavelength and increases to longest wavelength.

A. radio, infrared, ultraviolet, gamma rays
B. radio, ultraviolet, infrared, gamma rays
C. gamma rays, radio, ultraviolet, infrared
D. gamma rays, infrared, radio, ultraviolet
E. gamma rays, ultraviolet, infrared, radio

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Hard
Gradable: automatic
Subtopic: Electromagnetic Radiation (Wave Properties)
Subtopic: Measurement (SI Units)
Subtopic: Scientific Notation and Significant Figures
Topic: Quantum Theory and Atomic Structure

3. Select the arrangement of electromagnetic radiation which starts with the lowest energy and increases to the greatest energy.

A. radio, infrared, ultraviolet, gamma rays
radio, ultraviolet, infrared, gamma rays
gamma rays, infrared, radio, ultraviolet
gamma rays, ultraviolet, infrared, radio
infrared, ultraviolet, radio, gamma rays

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Hard
Gradable: automatic
Subtopic: Electromagnetic Radiation (Wave Properties)
Topic: Quantum Theory and Atomic Structure

4. What is the emission of light at only specific wavelengths?

A. Emission spectra
B. Hydrogen spectrum
C. Wave spectra
D. Limited spectra
E. Line spectra

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Spectra (Bohr Model of the Atom)
Subtopic: Electromagnetic Radiation (Wave Properties)
Subtopic: Measurement (SI Units)
Subtopic: Scientific Notation and Significant Figures
Topic: Quantum Theory and Atomic Structure

5. List the following types of radiation from lowest frequency to highest frequency: microwave, X ray, ultraviolet, visible, and infrared

A. microwave < infrared < visible < ultraviolet < X ray

B. X ray < ultraviolet < visible < infrared < microwave

C.visible < ultraviolet < microwave < X ray < infrared

D. infrared < X ray < microwave < ultraviolet < visible

E. infrared < visible < microwave < ultraviolet < X ray

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Easy
Gradable: automatic
Subtopic: Electromagnetic Radiation (Wave Properties)
Topic: Quantum Theory and Atomic Structure

6. Which of the following electron transitions would be expected to emit any light in the Bohr model of the atom?

A. $n = 1$ to $n = 3$
B. $n = 5$ to $n = 6$
C. $n = 2$ to $n = 5$
D. $n = 4$ to $n = 3$

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Spectra (Bohr Model of the Atom)
Topic: Quantum Theory and Atomic Structure

7. Which of the following electron transitions would be expected to emit any light in the Bohr model of the atom?

A. $n = 1$ to $n = 4$
B. $n = 3$ to $n = 1$
C. $n = 2$ to $n = 3$
D. $n = 5$ to $n = 7$

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Spectra (Bohr Model of the Atom)
Topic: Quantum Theory and Atomic Structure

8. Which of the following electron transitions would be expected to absorb any light in the Bohr model of the atom?

A. $n = 1$ to $n = 3$
B. $n = 3$ to $n = 2$
C. $n = 4$ to $n = 2$
D. $n = 6$ to $n = 5$

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Spectra (Bohr Model of the Atom)
Topic: Quantum Theory and Atomic Structure

9. Which of the following electron transitions would be expected to absorb any light in the Bohr model of the atom?

A. $n = 7$ to $n = 2$
B. $n = 5$ to $n = 6$
C. $n = 1$ to $n = 3$
D. $n = 3$ to $n = 5$

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Spectra (Bohr Model of the Atom)
Topic: Quantum Theory and Atomic Structure

10. The size of an atomic orbital is associated with

A. the principal quantum number (n).
B. the angular momentum quantum number (l).
C. the magnetic quantum number (m_l).
D. the spin quantum number (m_s).
E. the angular momentum and magnetic quantum numbers, together.

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Theories
Subtopic: Quantum Numbers
Topic: Components of Matter
Topic: Quantum Theory and Atomic Structure

11. Atomic orbitals developed using quantum mechanics

A. describe regions of space in which one is most likely to find an electron.
B. describe exact paths for electron motion.
C. give a description of the atomic structure which is essentially the same as the Bohr model.
E. allow scientists to calculate an exact volume for the hydrogen atom.
F. are in conflict with the Heisenberg uncertainty principle.

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Atomic Theories
Subtopic: Quantum Numbers
Topic: Components of Matter
Topic: Quantum Theory and Atomic Structure

12. The number of orbitals in a *d* subshell is

A. 1.
B. 2.
C. 3.
D. 5.
E. 7.

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

13. How many orbitals can have the 3*p* description in a given atom?

A. 1
B. 2
C. 3
D. 5

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Quantum Numbers
Topic: Quantum Theory and Atomic Structure

14. How many orbitals can have the 3*d* description in a given atom?

A. 1
B. 2
C. 3
D. 5

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Quantum Numbers
Topic: Quantum Theory and Atomic Structure

15. How many orbitals can have the 4*s* description in a given atom?

A. 1
B. 2
C. 3
D. 5

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Quantum Numbers
Topic: Quantum Theory and Atomic Structure

16. How many orbitals can have the 4*p* description in a given atom?

A. 1
B. 2
C. 3
D. 4

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Quantum Numbers
Topic: Quantum Theory and Atomic Structure

17. Determine which sublevel designation is legitimate.

A. 1*f*
B. 2*d*
C. 3*c*
D. 4*s*

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Quantum Numbers
Topic: Quantum Theory and Atomic Structure

18. Determine which sublevel designation is legitimate.

A. 1*p*
B. 2*p*
C. 3*f*
D. 4*z*

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Quantum Numbers
Topic: Quantum Theory and Atomic Structure

19. Determine which sublevel designation is not legitimate.

A. 1*p*
B. 2*s*
C. 3*d*
D. 4*p*

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Quantum Numbers
Topic: Quantum Theory and Atomic Structure

20. Determine which sublevel designation is not legitimate.

A. 4*s*
B. 2*d*
C. 3*s*
D. 5*p*

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Quantum Numbers
Topic: Quantum Theory and Atomic Structure

21. How many orbitals are there in the $n = 4$ level of the H-atom?

A. 4
B. 6
C. 8
D. 16
E. 18

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Hard
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

22. Each shell (principal energy level) of quantum number *n* contains *n* subshells.

TRUE

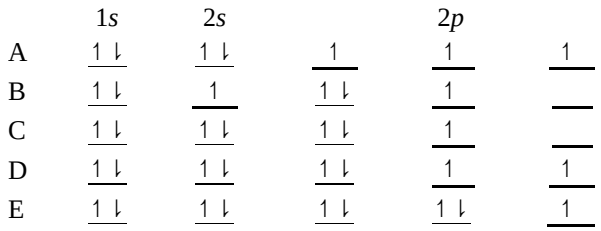
Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Medium
Gradable: automatic
Subtopic: Quantum Numbers
Topic: Quantum Theory and Atomic Structure

23. For all atoms of the same element, the 2*s* orbital is larger than the 1*s* orbital.

TRUE

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Quantum Numbers
Topic: Quantum Theory and Atomic Structure

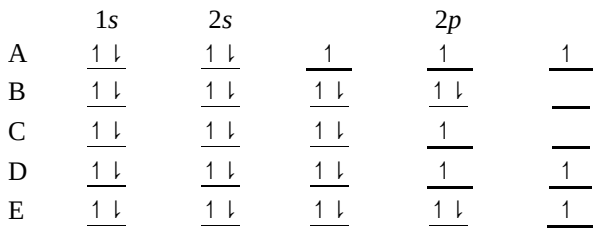
24. The orbital diagram for a ground-state nitrogen atom is



A. A
B. B
C. C
D. D
E. E

Bloom's Level: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

25. The orbital diagram for a ground-state oxygen atom is



A. A
B. B
C. C
D. D
E. E

Bloom's Level: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

26. The orbital diagram for a ground-state carbon atom is

	1*s*	2*s*		2*p*	
A	↑↓	↑↓	↑↓		
B	↑↓	↑	↑	↑	↑
C	↑↓	↑↓	↑	↑	↑
D	↑↓	↑↓	↑	↑	
E	↑↓	↑↓	↑↓	↑↓	↑

A. A
B. B
C. C
D. D
E. E

Bloom's Level: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

27. Which ground-state atom has an electron configuration described by the following *orbital diagram*?

[Ar] ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑ ↑

4*s* 3*d* 4*p*

A. phosphorus
B. germanium
C. selenium
D. tellurium
E. potassium

Bloom's Level: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

28. Which ground-state atom has an electron configuration described by the following *orbital diagram*?

[Ne] ↑↓ ↑ ↑ ↑

3*s* 3*p*

A. phosphorus
B. nitrogen
C. arsenic
D. vanadium
E. sulfur

Bloom's Level: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

29. How many unpaired electrons does a ground-state atom of sulfur have?

A. 0
B. 1
C. 2
D. 3
E. 4

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Pauli Exclusion Principle
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

30. Which element has the following ground-state electron configuration? $1s^2\ 2s^2\ 2p^6\ 3s^2$

Na
Mg
Al
Si
Ne

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Energy-Level Splitting (Zeff and Shielding)
Subtopic: Hund's Rule
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

31. Which element has the following ground-state electron configuration?

$[Kr]5s^2 4d^{10} 5p^3$

A. Sn
B. Sb
C. Pb
D. Bi
E. Te

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Energy-Level Splitting (Zeff and Shielding)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

32. Which element has the following ground-state electron configuration?

$[Kr]5s^2 4d^{10} 5p^2$

A. Sn
B. Sb
C. Pb
D. Ge
E. Te

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Energy-Level Splitting (Zeff and Shielding)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

33. The electron configuration of a ground-state Co atom is

A. $[Ar]4s^2 3d^7$
B. $1s^2 2s^2 2p^6 3s^2 3d^9$
C. $[Ne]3s^2 3d^7$
D. $[Ar]4s^1 3d^5$
E. $[Ar]4s^2 4d^7$

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Energy-Level Splitting (Zeff and Shielding)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

34. The electron configuration of a ground-state vanadium atom is

A. $[Ar]4s^2 4d^3$
B. $[Ar]4s^2 4p^3$
C. $[Ar]4s^2 3d^3$
D. $[Ar]3d^5$
E. $[Ar]4s^2 3d^7$

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Energy-Level Splitting (Zeff and Shielding)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

35. The ground-state electron configuration for an atom of indium is

A. [Kr]$5s^2 4p^6 4d^5$
B. [Ar]$4s^2 3d^{10} 4p^1$
C. [Ar]$4s^2 4p^6 3d^5$
D. [Kr]$5s^2 5p^6 4d^5$
E. [Kr]$5s^2 4d^{10} 5p^1$

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Energy-Level Splitting (Zeff and Shielding)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

36. The ground-state electron configuration of a calcium atom is

A. [Ne]$3s^2$
B. [Ne]$3s^2 3p^6$
C. [Ar]$4s^1 3d^1$
D. [Ar]$4s^2$
E. [Ar]$3d^2$

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Energy-Level Splitting (Zeff and Shielding)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

37. Select the correct electron configuration for sulfur (Z = 16).

A. $1s^2 1p^6 2s^2 2p^6$
B. $1s^2 2s^2 2p^8 3s^2 3p^4$
C. $1s^2 2s^2 2p^8 3s^2 3p^2$
D. $1s^2 2s^2 2p^6 3s^2 3p^4$
E. $1s^2 2s^2 2p^6 3s^2 3d^4$

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

38. Select the correct electron configuration for Te (Z = 52).

A. [Kr]$5s^2 5p^6 4d^8$
B. [Kr]$5s^2 5d^{10} 5p^4$
C. [Kr]$5s^2 4d^{10} 5p^6$
D. [Kr]$5s^2 4f^{14}$
E. [Kr]$5s^2 4d^{10} 5p^4$

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Energy-Level Splitting (Zeff and Shielding)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

39. What is the correct electron configuration for a germanium (Ge) atom?

A. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4p^2$
B. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^2$
C. $1s^2 2s^2 2p^6 3s^2 3p^2$
D. $1s^2 2s^2 3s^2 3p^5$
E. None of the answers is correct.

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Energy-Level Splitting (Zeff and Shielding)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

40. The electronic structure $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^8$ refers to the ground state of

A. Kr.
B. Ni.
C. Fe.
D. Pd.
E. None of these choices is correct.

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Energy-Level Splitting (Zeff and Shielding)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

41. How many electrons are in the 4*p* orbitals of selenium?

A. 0
B. 2
C. 4
D. 5
E. 6

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

42. How many electrons are in the 4*p* orbitals of vanadium?

A. 0
B. 2
C. 4
D. 5
E. 6

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

43. How many electrons are in the 4*d* orbitals of Tc?

A. 1
B. 2
C. 3
D. 4
E. 5

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

44. How many electrons are there in the 2nd principal energy level (n = 2) of a phosphorus atom?

A. 3
B. 5
C. 6
D. 8
E. 10

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

45. How many electrons are there in the 3rd principal energy level (n = 3) of a phosphorus atom?

A. 3
B. 5
C. 6
D. 8
E. 10

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

46. What element is represented by the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^5$?

Mn
Ca
K
Cr
V

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Energy-Level Splitting (Zeff and Shielding)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

47. What element is represented by the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1 4d^{10}$?

A. Ag
B. Rb
C. Cd
D. Sr
E. Cu

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Energy-Level Splitting (Zeff and Shielding)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

48. What is the electron configuration for tungsten?

A. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^6$

B. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^1 4f^{14} 5d^5$

C. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^4$

D. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^7$

E. $1s^2 2s^2 2p^6 3s^2 3p^5 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^7$

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

49. What is the electron configuration for silicon?

A. $1s^2 2s^2 2p^6 3s^1 3p^3$

B. $1s^2 2s^2 2p^6 3s^2 3p^2$

C. $1s^2 2s^2 2p^6 3s^4$

D. $1s^2 2s^2 2p^6 3p^4$

E. $1s^2 2s^2 2p^6 3s^2 3p^3$

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

50. What is the electron configuration for bromine?

A. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 4d^{10} 4p^6$

B. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4d^{10} 4p^5$

C. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^{10} 4p^6$

D. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^4$

E. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Energy-Level Splitting (Zeff and Shielding)
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

51. Which of the following elements has the largest number of unpaired electrons in the ground state?

A. K
B. V
C. S
D. Si
E. Cl

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Hard
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Diamagnetism and Paramagnetism
Subtopic: Energy-Level Splitting (Zeff and Shielding)
Subtopic: Hund's Rule
Subtopic: Quantum Numbers
Topic: Electron Configuration
Topic: Quantum Theory and Atomic Structure

52. The general electron configuration for atoms of all elements in Group 5A is

A. $ns^2 np^6$.
B. $ns^2 np^5$.
C. $ns^2 np^4$.
D. $ns^2 np^3$.
E. $ns^2 np^1$.

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

53. Which of these choices is the general electron configuration for the outermost electrons of elements in the alkaline earth group?

A. ns^1
B. ns^2
C. ns^2np^4
D. ns^2np
E. $ns^2np^6\ (n-1)d^6$

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Electron Configuration

54. The general electron configuration for atoms of the halogen group is

A. ns^2np^6.
B. ns^2np^5.
C. $ns^2np^6\ (n-1)d^7$.
D. ns^1.
E. ns^2np^7.

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Electron Configuration

55. The general electron configuration for noble gas atoms is

A. ns^2np^6.
B. ns^2np^5.
C. ns^2np^4.
D. ns^2np^3.
E. ns^2.

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Electron Configuration

56. Each of the noble gases has a completely filled *p* subshell except for which one?

A. Xenon
B. Neon
C. Radon
D. Argon
E. Helium

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Electron Configuration

57. An element with the general electron configuration for its outermost electrons of ns^2np^1 would be in which element group?

A. 2A
B. 3A
C. 4A
D. 5A
E. 8A

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Electron Configuration

58. In what group of the periodic table is the element with the electron configuration $[Ar]4s^23d^{10}4p^3$?

A. 1A
B. 2A
C. 3A
D. 4A
E. 5A

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Electron Configuration

59. Consider the element with the electron configuration $[Kr]5s^24d^7$. This element is

A. a halogen.
B. a transition metal.
C. a nonmetal.
D. an actinide element.
E. a noble gas.

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Periodic Classification of the Elements
Subtopic: Properties of Transition Metals
Topic: Chemical Periodicity
Topic: Electron Configuration
Topic: Transition Metals and Coordination Compounds

60. Consider the element with the electron configuration [Kr]$5s^2 4d^{10} 5p^5$. This element is

A. a halogen.
B. a transition metal.
C. an alkali metal.
D. an actinide element.
E. a noble gas.

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Electron Configuration

61. Consider the element with the electron configuration [Xe]$6s^2 4f^7$. This element is

A. a halogen.
B. a lanthanide element.
C. a nonmetal.
D. an actinide element.
E. a noble gas.

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Electron Configuration

62. How many *valence electrons* does a carbon atom have?

A. 1
B. 2
C. 3
D. 4
E. 6

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Electron Configuration

63. How many *valence electrons* does a tin (Sn) atom have?

A. 2
B. 4
C. 14
D. 36
E. 50

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Electron Configuration

64. An element with the electron configuration [noble gas]$ns^2(n-1)d^8$ has _____ valence electrons.

A. 2
B. 6
C. 8
D. 10
E. None of these choices is correct.

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Electron Configuration

65. An element with the electron configuration [noble gas]$ns^2(n-1)d^{10}np^3$ has _____ valence electrons.

A. 2
B. 3
C. 5
D. 10
E. 15

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Electron Configuration

66. How does atomic radius change as you move across the periodic table?

A. Atomic radius decreases moving from left to right across a period and increases from top to bottom.
B. Atomic radius increases moving left to right across a period and decreases from top to bottom.
C. Smaller nuclear charge lowers energy; more electrons in an orbital lowers energy.
D. Atomic radius increases diagonally across the periodic table.
E. None of the answers is correct.

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

67. Which of these atoms has the smallest radius?

A. Al
B. P
C. As
D. Te
E. Na

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

68. Which of these atoms has the largest radius?

A. B
B. Ga
C. Br
D. Si
E. Cl

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

69. Which of the elements listed below has the greatest atomic radius?

A. B
B. Al
C. S
D. P
E. Si

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

70. Which one of these ions has the smallest radius?

A. Cl^-
B. K^+
C. S^{2-}
D. Na^+
E. O^{2-}

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Hard
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

71. Arrange P, S, and O in order of increasing atomic radius.

A. S < O < P
B. P < S < O
C. O < S < P
D. O < P < S
E. The answer cannot be determined from the data given.

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

.

72. Arrange these ions in order of increasing ionic radius: K^+ , P^{3-} , S^{2-} , Cl^-.

A. $K^+ < Cl^- < S^{2-} < P^{3-}$

B.$K^+ < P^{3-} < S^{2-} < Cl^-$

C. $P^{3-} < S^{2-} < Cl^- < K^+$

D. $Cl^- < S^{2-} < P^{3-} < K^+$

E. $Cl^- < S^{2-} < K^+ < P^{3-}$

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Hard
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

73. Which of the following elements has the largest atomic size?

A. S
B. Ca
C. Ba
D. Po
E. Rn

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

74. Which of the following elements has the smallest atomic size?

A. Na
B. Ar
C. K
D. Ca
E. Kr

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

75. Select the element that will lose an electron most easily, based on the periodic trend.

A. Li
B. Na
C. K
D. He

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

76. Select the element that will lose an electron most easily, based on the periodic trend.

A. Na
B. Mg
C. Ar
D. P

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

77. Select the element that will gain an electron most easily, based on the periodic trend.

A. Ca
B. Mg
C. O
D. P

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

78. Select the element that will gain an electron most easily, based on the periodic trend.

A. Rb
B. Al
C. S
D. Na

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

79. Which of these elements has the greatest metallic character?

A. Br
B. F
C. Ge
D. Mn
E. Sc

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

80. Which of these elements has the greatest metallic character?

A. Br
B. Se
C. Ni
D. As
E. Si

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

81. Select the element with the greatest metallic character.

A. Li
B. Ca
C. Al
D. Pb
E. Cs

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

82. Select the element with the least metallic character.

A. Sn
B. Sr
C. Tl
D. Ge
E. Ga

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Trends in Physical Properties (Atomic Radius, Ionization Energy, Ionic Radius, Electron Affinity)
Topic: Chemical Periodicity

83. Using the periodic table, predict the charge on the common ion of calcium.

A. +1
B. +2
C. −1
D. −2

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Electron Configurations of Cations and Anions
Topic: Electron Configuration

84. Using the periodic table, predict the charge on the common ion of selenium.

A. +1
B. +2
C. −1
D. −2

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Electron Configurations of Cations and Anions
Topic: Electron Configuration

85. Using the periodic table, predict the charge on the common ion of rubidium.

A. +1
B. +2
C. −1
D. −2

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Electron Configurations of Cations and Anions
Topic: Electron Configuration

86. Using the periodic table, predict the charge on the common ion of bromine.

A. +1
B. +2
C. −1
D. −2

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Electron Configurations of Cations and Anions
Topic: Electron Configuration

87. The Lewis dot symbol consists of the symbol for the element surrounded by dot(s). What does the symbol represent?

A. Electron configuration
B. Valence electrons
C. Atomic number
D. Atomic mass
E. Nucleus and core electrons

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Medium
Gradable: automatic
Subtopic: Lewis Dot Symbols
Subtopic: Writing Lewis Dot Structures
Topic: Chemical Bonding
Topic: Molecular Shape

88. The Lewis dot symbol consists of the symbol for the element surrounded by dot(s). What does the dot or dots represent?

A. Electron configuration
B. Valence electrons
C. Atomic number
D. Atomic mass
E. Core electrons

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Lewis Dot Symbols
Subtopic: Writing Lewis Dot Structures
Topic: Chemical Bonding
Topic: Molecular Shape

89. How many dots does the Lewis dot symbol for argon have around it?

A. 1
B. 2
C. 4
D. 6
E. 8

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Lewis Dot Symbols
Subtopic: Writing Lewis Dot Structures
Topic: Chemical Bonding
Topic: Molecular Shape

90. How many dots does the Lewis dot symbol for sodium have around it?

A. 1
B. 2
C. 0
D. 3
E. 7

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Lewis Dot Symbols
Subtopic: Writing Lewis Dot Structures
Topic: Chemical Bonding
Topic: Molecular Shape

91. How many dots does the Lewis dot symbol for magnesium have around it?

A. 1
B. 2
C. 0
D. 3
E. 7

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Lewis Dot Symbols
Subtopic: Writing Lewis Dot Structures
Topic: Chemical Bonding
Topic: Molecular Shape

92. How many dots does the Lewis dot symbol for chlorine have around it?

A. 1
B. 2
C. 5
D. 7
E. 17

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Lewis Dot Symbols
Subtopic: Writing Lewis Dot Structures
Topic: Chemical Bonding
Topic: Molecular Shape

93. How many dots does the Lewis dot symbol for carbon have around it?

A. 4
B. 2
C. 6
D. 3
E. 7

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Lewis Dot Symbols
Subtopic: Writing Lewis Dot Structures
Topic: Chemical Bonding
Topic: Molecular Shape

94. How many dots does the Lewis dot symbol for oxygen have around it?

A. 4
B. 2
C. 6
D. 3
E. 7

Accessibility: Keyboard Navigation
Bloom's Level: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Lewis Dot Symbols
Subtopic: Writing Lewis Dot Structures
Topic: Chemical Bonding
Topic: Molecular Shape

95. The Lewis dot symbol for the a lead atom is

A. 

B. 

C. 

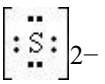
D. 

E. 

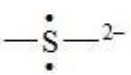
Bloom's Level: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Lewis Dot Symbols
Subtopic: Writing Lewis Dot Structures
Topic: Chemical Bonding
Topic: Molecular Shape

96. The Lewis dot symbol for the S^{2-} ion is

A. 

B. 

C. $_S\ 2-$

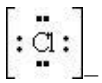
D. 

E. 

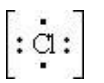
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Lewis Dot Symbols
Subtopic: Writing Lewis Dot Structures
Topic: Chemical Bonding
Topic: Molecular Shape

97. The Lewis dot symbol for the chloride ion is

A. 

B. 

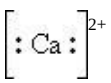
C. 

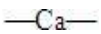
D. 

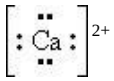
E. Cl^-

Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Lewis Dot Symbols
Subtopic: Writing Lewis Dot Structures
Topic: Chemical Bonding
Topic: Molecular Shape

98. The Lewis dot symbol for the calcium ion is

A. 

B. 

C. 

D. Ca^{2+}

E. Ca

Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Lewis Dot Symbols
Subtopic: Writing Lewis Dot Structures
Topic: Chemical Bonding
Topic: Molecular Shape

99. Select the element whose Lewis symbol is correct.

A. $\cdot Fr\cdot$

B. $:Te:$

C. $\cdot Ra\cdot$

D. $\cdot Pb\cdot$

E. $\cdot He\cdot$

Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Lewis Dot Symbols
Subtopic: Writing Lewis Dot Structures
Topic: Chemical Bonding
Topic: Molecular Shape

100. Select the element whose Lewis symbol is correct.

A. •Ga•

B. •Al•

C. Al•
•

D. • Tl •
•

Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Lewis Dot Symbols
Subtopic: Writing Lewis Dot Structures
Topic: Chemical Bonding
Topic: Molecular Shape

101. A magnesium ion, Mg^{2+}, has

A. 12 protons and 13 electrons.
B. 24 protons and 26 electrons.
C. 12 protons and 10 electrons.
D. 24 protons and 22 electrons.
E. 12 protons and 14 electrons.

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Electron Configurations of Cations and Anions
Subtopic: Structure of the Atom
Topic: Components of Matter
Topic: Electron Configuration

102. An aluminum ion, Al^{3+}, has

A. 13 protons and 13 electrons.
B. 27 protons and 24 electrons.
C. 16 protons and 13 electrons.
D. 13 protons and 10 electrons.
E. 10 protons and 13 electrons.

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Electron Configurations of Cations and Anions
Subtopic: Structure of the Atom
Topic: Components of Matter
Topic: Electron Configuration

103. An oxide ion, O^{2-}, has

A. 8 protons and 10 electrons.
B. 10 protons and 8 electrons.
C. 8 protons and 9 electrons.
D. 8 protons and 7 electrons.
E. 10 protons and 7 electrons.

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Electron Configurations of Cations and Anions
Subtopic: Structure of the Atom
Topic: Components of Matter
Topic: Electron Configuration

104. A sulfide ion, S^{2-}, has

A. 16 protons and 16 electrons.
B. 32 protons and 16 electrons.
C. 16 protons and 14 electrons.
D. 16 protons and 18 electrons.
E. 32 protons and 18 electrons.

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Electron Configurations of Cations and Anions
Subtopic: Structure of the Atom
Topic: Components of Matter
Topic: Electron Configuration

105. How many protons and electrons are present in one Br^- ion?

A. 35 protons, 35 electrons
B. 80 protons, 81 electrons
C. 35 protons, 34 electrons
D. 35 protons, 36 electrons
E. 80 protons, 34 electrons

Accessibility: Keyboard Navigation
Bloom's Level: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Electron Configurations of Cations and Anions
Subtopic: Structure of the Atom
Topic: Components of Matter
Topic: Electron Configuration

106. An isoelectronic series is

A. a series that has two or more species that have identical nuclear charges, but have different electron configurations.
B. a series that has the same ionization potentials.
C. a series that can have only up to three species and have similar electron configuration and similar nuclear charges.
D. a series that has two or more species that have identical electron configurations, but different nuclear charges.
E. a series that has the same nuclear charge.

Accessibility: Keyboard Navigation
Bloom's Level: 2. Understand
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Topic: Electron Configuration

107. Which of these species make an *isoelectronic pair*: Cl^-, O^{2-}, F, Ca^{2+}, Fe^{3+}?

A. Ca^{2+} and Fe^{3+}
B. O^{2-} and F
C. F and Cl^-
D. Cl^- and Ca^{2+}
E. None of the above species are part of an isoelectronic series.

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Electron Configurations of Cations and Anions
Topic: Electron Configuration

108. Which of these pairs consists of *isoelectronic* species?

A. Mn^{2+} and Ar
B. Zn^{2+} and Cu^{2+}
C. Na^+ and K^+
D. Cl^- and S
E. K^+ and Cl^-

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Electron Configurations of Cations and Anions
Topic: Electron Configuration

109. Which ion is *isoelectronic* with Ar?

A. Fe^{2+}
B. F^-
C. Br^-
D. Ga^{3+}
E. Ca^{2+}

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Electron Configurations of Cations and Anions
Topic: Electron Configuration

110. Which one of these ions is *not* isoelectronic with Kr?

A. As^{3+}
B. Se^{2-}
C. Rb^{+}
D. Sr^{2+}
E. Br^{-}

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Electron Configurations of Cations and Anions
Topic: Electron Configuration

111. Which of these choices is the electron configuration for the aluminum ion?

A. $1s^2 2s^2 2p^6 3s^2$

B. $1s^2 2s^2 2p^6 3s^2 3p^2$

C. $1s^2 2s^2 2p^6 3s^2 3p^1$

D. $1s^2 2s^2 2p^6$

E. $1s^2 2s^2 2p^6 3s^2 3p^4$

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Hard
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Electron Configurations of Cations and Anions
Topic: Electron Configuration

112. Which of these choices is the electron configuration for the chloride ion?

A. $[Ne]3s^2 3p^4$

B. $[Ne]3s^2 3p^7$

C. [Ar]

D. $[Ar]4s^1$

E. $[Ne]3s^2 3p^5$

Accessibility: Keyboard Navigation
Bloom's Level: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Assigning Electrons to Atomic Orbitals (Aufbau Principle)
Subtopic: Electron Configurations of Cations and Anions
Topic: Electron Configuration

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