

- Compared to the atoms of nonmetals in Period 3, the atoms of metals in Period 3 have
 - fewer valence electrons
 - more valence electrons
 - fewer electron shells
 - more electron shells
- The elements on the Periodic Table are arranged in order of increasing
 - atomic number
 - mass number
 - number of isotopes
 - number of moles
- If an element, X , can form an oxide that has the formula X_2O_3 , then element X would most likely be located on the Periodic Table in the same group as
 - Ba
 - Cd
 - In
 - Na
- Which element has chemical properties that are most similar to the chemical properties of sodium?
 - beryllium
 - calcium
 - lithium
 - magnesium
- Which list of elements contains a metal, a metalloid, a nonmetal, and a noble gas?
 - Be, Si, Cl, Kr
 - C, N, Ne, Ar
 - K, Fe, B, F
 - Na, Zn, As, Sb
- The chemical properties of calcium are most similar to the chemical properties of
 - Ar
 - K
 - Mg
 - Sc
- Which two elements have the most similar chemical properties?
 - Be and Mg
 - Ca and Br
 - Cl and Ar
 - Na and P
- Elements on the modern Periodic Table are arranged in order of increasing
 - atomic mass
 - atomic number
 - number of neutrons
 - number of valence electrons
- Which statement identifies the element arsenic?
 - Arsenic has an atomic number of 33.
 - Arsenic has a melting point of 84 K.
 - An atom of arsenic in the ground state has eight valence electrons.
 - An atom of arsenic in the ground state has a radius of 146 pm.
- Which elements are malleable and good conductors of electricity?
 - iodine and silver
 - iodine and xenon
 - tin and silver
 - tin and xenon
- Which element has the highest melting point?
 - tantalum
 - rhenium
 - osmium
 - hafnium
- Which substance can *not* be broken down by a chemical change?
 - methane
 - propanal
 - tungsten
 - water
- Which element is a noble gas?
 - krypton
 - chlorine
 - antimony
 - manganese

14. Which Group 14 element is classified as a metal?
1) carbon 3) silicon
2) germanium 4) tin
15. At STP, which element is solid, brittle, and a poor conductor of electricity?
1) Al 3) Ne
2) K 4) S
16. At STP, which element is brittle and *not* a conductor of electricity?
1) S 3) Na
2) K 4) Ar
17. Which element is classified as a nonmetal?
1) Be 3) Si
2) Al 4) Cl
18. At STP, an element that is a brittle solid and a poor conductor of heat and electricity could have an atomic number of
1) 12 3) 16
2) 13 4) 17
19. Which is a property of most nonmetallic solids?
1) high thermal conductivity
2) high electrical conductivity
3) brittleness
4) malleability
20. An atom in the ground state has a stable valence electron configuration. This atom could be an atom of
1) Al 3) Na
2) Cl 4) Ne
21. What are two properties of most nonmetals?
1) high ionization energy and poor electrical conductivity
2) high ionization energy and good electrical conductivity
3) low ionization energy and poor electrical conductivity
4) low ionization energy and good electrical conductivity
22. An atom of argon in the ground state tends *not* to bond with an atom of a different element because the argon atom has
1) more protons than neutrons
2) more neutrons than protons
3) a total of two valence electrons
4) a total of eight valence electrons
23. Which substance can *not* be decomposed by a chemical change?
1) Ne 3) HF
2) N₂O 4) H₂O
24. Which element is a metalloid?
1) Al 3) As
2) Ar 4) Au
25. Which Group 14 element is a metalloid?
1) tin 3) lead
2) silicon 4) carbon
26. Which element is malleable and a good conductor of electricity at STP?
1) argon 3) iodine
2) carbon 4) silver

39. An atom in the ground state contains a total of 5 electrons, 5 protons, and 5 neutrons. Which Lewis electron-dot diagram represents this atom?
- 1) $\cdot\ddot{X}\cdot$ 3) $\ddot{X}\cdot$
- 2) $:\ddot{X}\cdot$ 4) $:\ddot{X}:$
40. Which Lewis electron-dot diagram represents a boron atom in the ground state?
- 1) $\cdot\dot{B}$ 3) $:\dot{B}\cdot$
- 2) $:\dot{B}$ 4) $:\dot{B}\cdot$
41. What is the total number of electrons in an atom of potassium?
- 1) 15 3) 20
- 2) 19 4) 39
42. The valence electrons of a germanium atom in the ground state are located in the
- 1) first shell 3) third shell
- 2) second shell 4) fourth shell
43. Which compound forms a green aqueous solution?
- 1) RbCl 3) NiCl₂
- 2) CaCl₂ 4) ZnCl₂
44. Aqueous solutions of compounds containing element X are blue. Element X could be
- 1) carbon 3) sodium
- 2) copper 4) sulfur
45. An atom of which element has the largest atomic radius?
- 1) Fe 3) Si
- 2) Mg 4) Zn
46. Which characteristics both generally *decrease* when the elements in Period 3 on the Periodic Table are considered in order from left to right?
- 1) nonmetallic properties and atomic radius
- 2) nonmetallic properties and ionization energy
- 3) metallic properties and atomic radius
- 4) metallic properties and ionization energy
47. As atomic number increases within Group 15 on the Periodic Table, atomic radius
- 1) decreases, only
- 2) increases, only
- 3) decreases, then increases
- 4) increases, then decreases
48. As the elements of Group 17 are considered in order of increasing atomic number, there is an increase in
- 1) atomic radius
- 2) electronegativity
- 3) first ionization energy
- 4) number of electrons in the first shell
49. An ion of which element has a larger radius than an atom of the same element?
- 1) aluminum 3) magnesium
- 2) chlorine 4) sodium

50. How do the atomic radius and metallic properties of sodium compare to the atomic radius and metallic properties of phosphorus?
- 1) Sodium has a larger atomic radius and is more metallic.
 - 2) Sodium has a larger atomic radius and is less metallic.
 - 3) Sodium has a smaller atomic radius and is more metallic.
 - 4) Sodium has a smaller atomic radius and is less metallic.
51. When an atom of phosphorus becomes a phosphide ion (P^{3-}), the radius
- 1) decreases
 - 2) increases
 - 3) remains the same
52. Which atom has the *weakest* attraction for the electrons in a bond with an H atom?
- 1) Cl atom
 - 2) F atom
 - 3) O atom
 - 4) S atom
53. Which statement describes the general trends in electronegativity and metallic properties as the elements in Period 2 are considered in order of increasing atomic number?
- 1) Both electronegativity and metallic properties decrease.
 - 2) Both electronegativity and metallic properties increase.
 - 3) Electronegativity decreases and metallic properties increase.
 - 4) Electronegativity increases and metallic properties decrease.
54. An atom of which element has the greatest attraction for electrons in a chemical bond?
- 1) As
 - 2) Ga
 - 3) Ge
 - 4) Se
55. Atoms of which element have the greatest tendency to gain electrons?
- 1) bromine
 - 2) chlorine
 - 3) fluorine
 - 4) iodine
56. Which atom in the ground state requires the *least* amount of energy to remove its valence electron?
- 1) lithium atom
 - 2) potassium atom
 - 3) rubidium atom
 - 4) sodium atom
57. Which element requires the *least* amount of energy to remove the most loosely held electron from a gaseous atom in the ground state?
- 1) bromine
 - 2) calcium
 - 3) sodium
 - 4) silver
58. Samples of four Group 15 elements, antimony, arsenic, bismuth, and phosphorus, are in the gaseous phase. An atom in the ground state of which element requires the *least* amount of energy to remove its most loosely held electron?
- 1) As
 - 2) Bi
 - 3) P
 - 4) Sb
59. Sodium atoms, potassium atoms, and cesium atoms have the same
- 1) atomic radius
 - 2) first ionization energy
 - 3) total number of protons
 - 4) oxidation state

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60. In the ground state, each atom of an element has two valence electrons. This element has a lower first ionization energy than calcium. Where is this element located on the Periodic Table?
- 1) Group 1, Period 4
 - 2) Group 2, Period 5
 - 3) Group 2, Period 3
 - 4) Group 3, Period 4
61. Which element is most chemically similar to chlorine?
- 1) Ar
 - 2) F
 - 3) Fr
 - 4) S
62. Which element is an alkali metal?
- 1) Na
 - 2) Mg
 - 3) Al
 - 4) Cl
63. The element in Period 2 with the largest atomic radius is
- 1) a halogen
 - 2) a noble gas
 - 3) an alkali metal
 - 4) an alkaline earth metal
64. Which element in Period 3 exists as diatomic molecules at STP?
- 1) argon
 - 2) chlorine
 - 3) aluminum
 - 4) sodium
65. Which group is known as the halogens?
- 1) 1
 - 2) 2
 - 3) 17
 - 4) 18
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Answer Key
[New Exam]

1. 1

2. 1

3. 3

4. 3

5. 1

6. 3

7. 1

8. 2

9. 1

10. 3

11. 2

12. 3

13. 1

14. 4

15. 4

16. 1

17. 4

18. 3

19. 3

20. 4

21. 1

22. 4

23. 1

24. 3

25. 2

26. 4

27. 2

28. 4

29. 2

30. 2

31. 4

32. 4

33. 3

34. 2

35. 3

36. 4

37. 4

38. 3

39. 3

40. 2

Answer Key
[New Exam]

41. 2

42. 4

43. 3

44. 2

45. 2

46. 3

47. 2

48. 1

49. 2

50. 1

51. Essay

52. 4

53. 4

54. 4

55. 3

56. 3

57. 3

58. 2

59. 4

60. 2

61. 2

62. 1

63. 3

64. 2

65. 3