

Chapter 11 Study Guide

1. When ignited, a uranium compound burns with a green flame. The wavelength of the light given off by this flame is greater than that of
2. Which one of the following types of radiation has the shortest wavelength, the greatest energy, and the highest frequency? Ultraviolet, infrared, red light, blue light
3. Which form of electromagnetic radiation has the longest wavelengths?
4. Which of the following frequencies corresponds to light with the longest wavelength?
a) $3.00 \times 10^{13} \text{ s}^{-1}$ b) $4.12 \times 10^5 \text{ s}^{-1}$ c) $8.50 \times 10^{20} \text{ s}^{-1}$ d) $9.12 \times 10^{12} \text{ s}^{-1}$
5. When a strontium salt is ignited, it burns with a red flame. The frequency of the light given off by this flame is greater than
6. What is the wavelength of a photon of red light (in nm) whose frequency is $4.60 \times 10^{14} \text{ Hz}$?
7. In Bohr's atomic theory, when an electron moves from one energy level to another energy level more distant from the nucleus energy is _____?
8. What does the principle quantum number n , mean?
9. How many f orbitals have the value $n = 3$?
10. How many electrons in an atom can be in $3d$ orbitals?
11. How many electrons can be held in $3f$ orbitals?
12. How many d orbitals have $n = 3$?
13. How many electrons in an atom can be in $4p$ orbitals?
14. If $n = 2$, how many orbitals are possible?
15. A given set of p orbitals consists of _____ orbitals.
16. List all possible orbitals in order
17. Which of the following atoms or ions has 3 unpaired electrons? N, O, Al, S^{2-} , Zn^{2+}
18. The electron configuration for the barium atom is:
19. The electron configuration for the carbon atom is:
20. The electron configuration of indium is
21. How many electrons can be contained in all the possible f orbitals?
22. Who was the first chemist to recognize patterns in chemical properties of the elements?
23. The electron configuration of Cr^{3+} is
24. An element has the electron configuration $[\text{Kr}]4d^{10}5s^25p^2$. The element is?
25. An element E has the electron configuration $[\text{Kr}]4d^{10}5s^25p^2$. The formula for the fluoride of E is most likely
26. An element with the electron configuration $[\text{Xe}]4f^{14}5d^76s^2$ would belong to which group?

27. The electron configuration for Cr is
28. All halogens have the following number of valence electrons:
29. Ti has _____ electrons in its d orbitals.
30. Germanium has _____ electrons in its 4p orbitals.
31. Fe has _____ that is (are) unpaired in its d orbitals.
32. Draw the orbital diagram for nitrogen
33. Draw the orbital diagrams for P, S, Ag, Cl, Ca, Pb
34. An atom of fluorine contains 9 electrons. How many of these electrons are in s orbitals?
35. How many unpaired electrons are there in an atom of sulfur in its ground state?
36. How many electrons can be contained in all of the orbitals with $n = 4$?
37. Write electron configurations for Ga, Mo, Ca, Br
38. The electron configuration of Ti^{2+} is
39. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^2$ is the correct electron configuration for which element?
40. The number of unpaired electrons in the outer subshell of a Cl atom is
41. For which of the following elements does the electron configuration for the lowest energy state show a partially filled d orbital? Ti, Rb, Cu, Ga, Kr
42. A line in the spectrum of atomic mercury has a wavelength of 254 nm. The frequency of this light is?
43. Which of the following electron configurations are different from those expected? Ca, Sc, Ti, V, Cr
44. Which of the following have 10 electrons in the d orbitals? Mn, Fe, Cu, Zn
45. Order the elements S, Cl, and F in terms of increasing ionization energy.
46. Order the elements S, Cl, and F in terms of increasing atomic radii.
47. Choose the element with the highest ionization energy. Na, Mg, Al, P, S
48. List the following atoms in order of increasing ionization energy: Li, Na, C, O, F.
49. Identify the element and state the number of unpaired electrons in its ground state:
 - a) $[Ar]4s^2 3d^4$
 - b) $[Ne]3s^2 3p^5$
 - c) $[Kr]5s^2 4d^{10} 5p^4$
 - d) $[Ar]4s^1 3d^{10}$
 - e) $[He]2s^2 2p^3$
50. Write the electron configuration for the following: P, Ag, S^{2-} , I, Fe^{3+} , K^+
51. Ionization energy increases from _____ (left to right or right to left) in a period of the PT. Why?
52. Ionization energy increases from _____ (top to bottom or bottom to top) in a family of the PT. Why?
53. For the set of elements Li, O, Ne, and Na, which element has the largest atomic radius?
54. The SI unit for frequency is _____.
55. Bohr's model correctly describes the hydrogen atom, but no other atoms. (T/F)
56. The _____ electrons are in the outermost principal quantum level of an atom.

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1. When ignited, a uranium compound burns with a green flame. The wavelength of the light given off by this flame is greater than that of BIU us X-Ray Gamma
2. Which one of the following types of radiation has the shortest wavelength, the greatest energy, and the highest frequency? Ultraviolet, infrared, red light, blue light
3. Which form of electromagnetic radiation has the longest wavelengths? Radio
4. Which of the following frequencies corresponds to light with the longest wavelength?
a) $3.00 \times 10^{13} \text{ s}^{-1}$ b) $4.12 \times 10^5 \text{ s}^{-1}$ c) $8.50 \times 10^{20} \text{ s}^{-1}$ d) $9.12 \times 10^{12} \text{ s}^{-1}$
5. When a strontium salt is ignited, it burns with a red flame. The frequency of the light given off by this flame is greater than Radio, micro, IR
6. What is the wavelength of a photon of red light (in nm) whose frequency is $4.60 \times 10^{14} \text{ Hz}$? 652 nm
7. In Bohr's atomic theory, when an electron moves from one energy level to another energy level more distant from the nucleus energy is absorbed.
8. What does the principle quantum number, n , mean? shell, distance from nucleus, energy
9. How many f orbitals have the value $n = 3$? 0
10. How many electrons in an atom can be in 3d orbitals? 10
11. How many electrons can be held in 3f orbitals? 0
12. How many d orbitals have $n = 3$? 5
13. How many electrons in an atom can be in 4p orbitals? 6
14. If $n = 2$, how many orbitals are possible? 4
15. A given set of p orbitals consists of 3 orbitals.
16. List all possible orbitals in order 1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p, 6s, 4f, 5d, 6p, 7s, 5f, 6d, 7p
17. Which of the following atoms or ions has 3 unpaired electrons? N, O, Al, S²⁻, Zn²⁺
18. The electron configuration for the barium atom is: [Xe] 6s²
19. The electron configuration for the carbon atom is: 1s² 2s² 2p²
20. The electron configuration of indium is [Kr] 5s² 4d¹⁰ 5p¹
21. How many electrons can be contained in all the possible f orbitals? 14 per level
22. Who was the first chemist to recognize patterns in chemical properties of the elements? Mendeleev
23. The electron configuration of Cr³⁺ is [Ar] 3d³
24. An element has the electron configuration [Kr]4d¹⁰5s²5p². The element is? Tin
25. An element E has the electron configuration [Kr]4d¹⁰5s²5p². The formula for the fluoride of E is most likely EF₄
26. An element with the electron configuration [Xe]4f¹⁴5d7s² would belong to which group? Ir

27. The electron configuration for Cr is $[Ar] 4s^1 3d^5$
28. All halogens have the following number of valence electrons: **7**
29. Ti has **2** electrons in its d orbitals.
30. Germanium has **2** electrons in its 4p orbitals.
31. Fe has **d** that is (are) unpaired in its d orbitals.
32. Draw the orbital diagram for nitrogen $\begin{array}{c} \uparrow\downarrow \\ 1s \\ \uparrow\downarrow \\ 2s \\ \uparrow \\ 2p \\ \uparrow \\ 2p \\ \uparrow \\ 2p \end{array}$
33. Draw the orbital diagrams for P, S, Ag, Cl, Ca, Pb *look them up*
34. An atom of fluorine contains 9 electrons. How many of these electrons are in s orbitals? **4**
35. How many unpaired electrons are there in an atom of sulfur in its ground state? **2**
36. How many electrons can be contained in all of the orbitals with $n = 4$? **32**
37. Write electron configurations for Ga, Mo, Ca, Br *look them up*
38. The electron configuration of Ti^{2+} is $[Ar] 3d^2$
39. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^2$ is the correct electron configuration for which element? **Ti**
40. The number of unpaired electrons in the outer subshell of a Cl atom is **1**
41. For which of the following elements does the electron configuration for the lowest energy state show a partially filled d orbital? **Ti, Rb, Cu, Ga, Kr**
42. A line in the spectrum of atomic mercury has a wavelength of 254 nm. The frequency of this light is? **$1.18 \times 10^{15} \text{ Hz}$**
43. Which of the following electron configurations are different from those expected? Ca, Sc, Ti, V, **Cr**
44. Which of the following have 10 electrons in the d orbitals? Mn, Fe, **Cu, Zn**
45. Order the elements S, Cl, and F in terms of increasing ionization energy. **S, Cl, F**
46. Order the elements S, Cl, and F in terms of increasing atomic radii. **F, Cl, S**
47. Choose the element with the highest ionization energy. Na, Mg, Al, **P, S**
48. List the following atoms in order of increasing ionization energy: Li, Na, C, O, F. **Na, Li, C, O, F**
49. Identify the element and state the number of unpaired electrons in its ground state:
 a) $[Ar] 4s^2 3d^4$ **Cr: 4** b) $[Ne] 3s^2 3p^5$ **Cl: 1** c) $[Kr] 5s^2 4d^{10} 5p^4$ **Te: 2** d) $[Ar] 4s^1 3d^{10}$ **Cu: 1** e) $[He] 2s^2 2p^3$ **N: 3**
50. Write the electron configuration for the following: P, Ag, S^{2-} , I, Fe^{3+} , K^+ *look it up*
51. Ionization energy increases from **L \rightarrow R** (left to right or right to left) in a period of the PT. Why?
52. Ionization energy increases from **B \rightarrow T** (top to bottom or bottom to top) in a family of the PT. Why?
53. For the set of elements Li, O, Ne, and Na, which element has the largest atomic radius? **Na**
54. The SI unit for frequency is **Hz**
55. Bohr's model correctly describes the hydrogen atom, but no other atoms. (T/F) **(F)**
56. The **Valence** electrons are in the outermost principal quantum level of an atom.