

Chapter 11 Prep Test

Matching

Match each item with the correct statement below.

- | | |
|---------------------|--------------------|
| A electronegativity | D period |
| B ionization energy | E transition metal |
| C atomic radius | F group |

- 1 ability of an atom to attract electrons when the atom is in a compound
- 2 vertical column in the periodic table
- 3 horizontal row in the periodic table
- 4 energy required to remove an electron from an atom
- 5 one-half the distance between the nuclei of two atoms when the atoms are joined
- 6 type of element characterized by the presence of electrons in the d orbital

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

Use the following passage and table to answer the following 2 questions

A student studying electron configurations in atoms created Table 1 in order to summarize the various facts she learned about principal energy levels, energy sublevels, and orbitals.

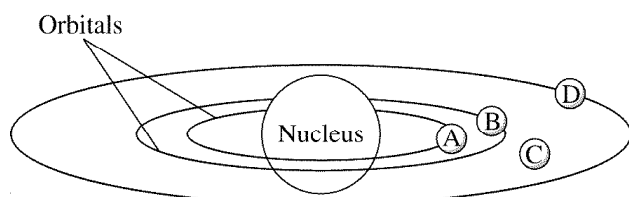
Table 1		
Facts About Principal Energy Levels, Sublevels, and Orbitals		
Principal Energy Level	Number of Sublevels	Description of Sublevel
$n = 1$	1	One sublevel (1s orbital)
$n = 2$	2	Two sublevels (one 2s orbital and three 2p orbitals)
$n = 3$	3	Three sublevels (one 3s orbital, three 3p orbitals, and five 3d orbitals)
$n = 4$	4	Four sublevels (one 4s orbital, three 4p orbitals, five 4d orbitals, and seven 4f orbitals)

- 7 What is the maximum number of electrons that can be contained in the third energy level?

A 4	C 12
B 8	D 18

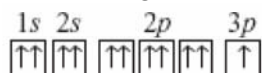
- 8 Based on Table 1 what is the relationship between the principal energy level number (n) and the number of energy sublevels that the principal energy level contains?
- A There is no clear relationship.
 - B They are the same.
 - C The number of orbitals is greater than the principal energy level number (n).
 - D The maximum number of electrons equals $2n^2 - 1$
- 9 What element has the e- configuration $[\text{Ne}]3s^23p^5$?
- A Chlorine
 - B Neon
 - C Sulfur
 - D Oxygen
- 10 An orbital that **could never** exist according to the quantum or wave-mechanical description of the atom is
- A $3d$.
 - B $8s$.
 - C $6d$.
 - D $1p$.
- 11 As you move down the periodic table from carbon through lead, atomic radii
- A generally increase.
 - B generally decrease.
 - C do not change.
 - D vary unpredictably.
- 12 A spherical electron cloud surrounding an atomic nucleus would best represent
- A an s orbital.
 - B a p_x orbital.
 - C a combination of p_x and p_y orbitals.
 - D a combination of an s and a p_x orbital.
- 13 The atomic emission spectra of a sodium atom on Earth and of a sodium atom in the sun would be ____.
- A the same
 - B different from each other
 - C the same as those of several other elements
 - D the same as each other only in the ultraviolet range
- 14 How does the energy of an electron change when the electron moves closer to the nucleus?
- A It decreases.
 - B It increases.
 - C It stays the same.
 - D It doubles.
- 15 In the Bohr model of the atom, an electron in an orbit has a fixed ____.
- A position
 - B color
 - C energy
 - D size
- 16 In a row/period in the periodic table, as you move across and as the atomic number increases, the atomic radius generally
- A decreases.
 - B remains constant.
 - C increases.
 - D becomes unmeasurable.

- 17 How are the frequency and wavelength of light related?
 A They are inversely proportional to each other.
 B Frequency equals wavelength divided by the speed of light.
 C Wavelength is determined by dividing frequency by the speed of light.
 D They are directly proportional to each other.
- 18 Electrons are elevated from the ground state to the excited state by:
 A the absorption of energy
 B the loss of mass
 C the release of energy
 D the destruction of energy
- 19 Which of the following subshells CANNOT exist in an atom?
 A 2p
 B 4d
 C 4f
 D 3f
- 20 If the s and p orbitals of the highest main energy level of an atom are filled with electrons, the atom has a(n)
 A electron pair.
 B octet.
 C ellipsoid.
 D circle.
- 21 The elements of the Noble Gas family, except for Helium, have an outer shell (s and p) of:
 A 6 electrons
 B 8 electrons
 C 2 electrons
 D 18 electrons



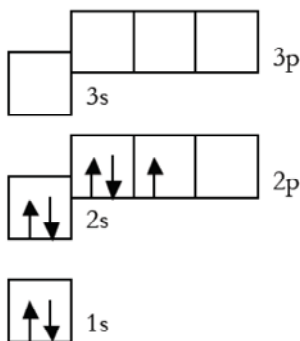
- 22 According to Bohr, electrons cannot reside at _____ in the figure above.
 A point A
 B point B
 C point C
 D point D
- 23 Which of the following groups of atoms have the same outermost electron configurations but with different (principal) energy levels?
 A N, O, F, Ne
 B S, Cl, Ar, K
 C Ca, Ge, Sr, In
 D O, S, Se, Te

- 24 A student drew the following electron box diagram for an atom of sodium in the ground state.

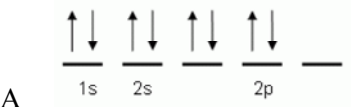
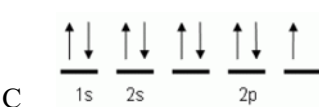
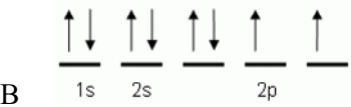
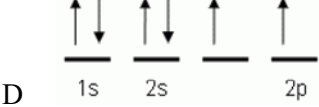


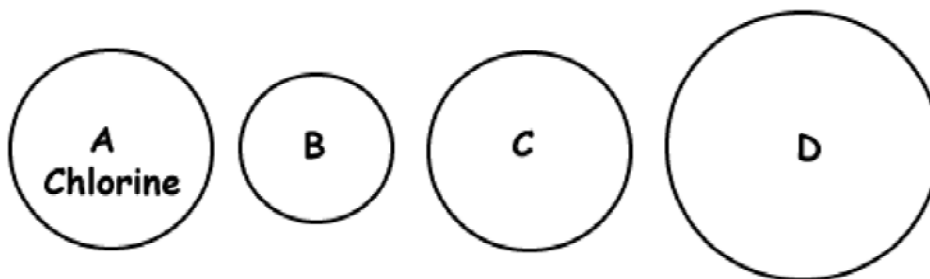
Which of the following statements is true?

- A The student's diagram is correct.
 B The student's diagram is incorrect because it shows an incorrect number of electron.
 C The student's diagram is incorrect because the arrows that represent the electrons should have opposite spins.
 D The student's diagram violates the law of conservation of mass.
- 25 Which of the following electron configurations is most likely to result in an element that is relatively inactive?
- A a half-filled energy sublevel
 B a filled energy sublevel
 C one empty and one filled energy sublevel
 D a filled highest occupied principal energy level



- 26 What element is displayed in the above electron orbital diagram?
- A Nitrogen
 B Carbon
 C Oxygen
 D None of these
- 27 The shape (not the size) of an electron cloud is determined by the electron's ____.
- A energy sublevel (*s*, *p*, *d*, & *f*)
 B diet
 C speed
 D principal quantum number
- 28 The element that has the greatest electronegativity is
- A oxygen.
 B sodium.
 C chlorine.
 D fluorine.
- 29 Bohr's theory helped explain why
- A electrons have negative charge.
 B most of the mass of the atom is in the nucleus.
 C excited atoms give off certain colors of light.
 D atoms combine to form molecules.

- 30 The atomic sublevel with the next highest energy after $4s$ is
 A $4p$. C $5p$.
 B $4f$. D $5s$.
- 31 The elements on the modern periodic table are organized by increasing:
 A atomic number C ionization energy
 B atomic mass D size
- 32 Write the ground-state electron configuration of a lead atom.
 A $[\text{Xe}] 6s1 5d5 4f14 6p6 7s2$ C $[\text{Xe}] 6s1 5d10 4f14 6p3$
 B $[\text{Xe}] 6s2 5d10 4f14 6p2$ D $[\text{Xe}] 6p4 4f14 5d10$
- 33 In a given atom, how many electrons can occupy the $3d$ set of orbitals?
 A 2 C 10
 B 6 D 14
- 34 The letter designations for the first four sublevels with the number of electrons that can be accommodated in each sublevel are
 A $s:1, p:3, d:10, \text{ and } f:14$. C $s:2, p:6, d:10, \text{ and } f:14$.
 B $s:1, p:3, d:5, \text{ and } f:7$. D $s:1, p:2, d:3, \text{ and } f:4$.
- 35 When a salt such as sodium chloride is exposed to a flame, the visible light given off is the result of:
 A ground state electrons moving to higher energy levels C excited electrons returning to the ground state
 B nuclear decay D gamma radiation
- 36 Which of the following is the correct orbital notation for the element oxygen (O, atomic #8)?
- A 
- C 
- B 
- D 
- 37 What is the shape of the $3p$ atomic orbital?
 A sphere C bar
 B dumbbell D two perpendicular dumbbells
- 38 Which element is predicted to have the ground-state electron configuration $[\text{He}] 2s^2$?
 A beryllium C boron
 B lithium D carbon



39 Given the representation of a chlorine atom, which circle might be a chloride ion, Cl^- ?

- A Circle A
B Circle B
C Circle C
D Circle D

40 The number of orbitals for the d sublevel is

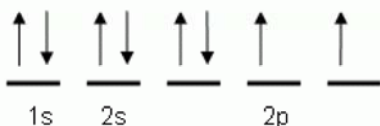
- A 1.
B 3.
C 5.
D 7.

41 The number of electrons in the highest energy level of the argon atom (atomic number 18) is

- A 10.
B 2.
C 6.
D 8.

42 In the alkaline-earth group, atoms with the smallest radii

- A are the most reactive.
B have the largest volume.
C are all gases.
D have the highest ionization energies.



43 The "up" and "down" arrows in electron orbital notation, such as is shown here, depict:

- A electrons and protons attracting each other
B oppositely charged electrons
C protons and neutrons in orbitals
D electrons with opposite spins

44 Cations have a _____ charge and are _____ than the atoms from which they formed.

- A positive/larger
B negative/smaller
C negative/larger
D positive/smaller

45 Which of the following is NOT a valid electron configuration?

- A $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$
B $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$
C $1s^2 2s^2 2p^6 2d^{10} 3s^2 3p^6 4s^2$
D $1s^2 2s^2 2p^6 3s^2 3p^6$