

Regents Chemistry: Do Now on Electron Configuration

 Name: KEY

Date: _____

Match each configuration with the best description.

- | | | |
|---|------------------------------|-------------------|
| 1. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^5$ | (A) has 3 unpaired electrons | 1. <u>D</u> |
| 2. $1s^2 2s^2 2p^5 3s^1$ | (B) is 5 full orbitals | 2. <u>B, F</u> |
| 3. $1s^2 2s^2 2p^3$ | (C) has 2 valence electrons | 3. <u>A</u> |
| 4. $1s^2 2s^2 2p^6$ | (D) is an excited state | 4. <u>B, D, E</u> |
| 5. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$ | (E) is a noble gas | 5. <u>C</u> |
| 6. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$ | (F) has 11 electrons | 6. <u>E</u> |

 Answer the following questions for the configuration $1s^2 2s^2 2p^6 3s^2 3p^5 4s^2 3d^{10} 4p^3$.

7. How many full principal energy levels? 3
8. How many full orbitals? 15
9. How many electrons? 33
10. How many unpaired electrons? 3
11. How many valence electrons? 5
12. How many completely filled sublevels? 7
13. What is the principal quantum number of the highest occupied energy level? 4

Noble Gas	Electron Configuration (Valence shell is underlined.)	Electrons in the valence shell
helium	$1s^2$	2
neon	$1s^2 \underline{2s^2 2p^6}$	8
argon	$1s^2 2s^2 2p^6 \underline{3s^2 3p^6}$	8
krypton	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} \underline{4s^2 4p^6}$	8
xenon	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 4f^{14} \underline{5s^2 5p^6}$	8
radon	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 4f^{14} 5s^2 5p^6 5d^{10} \underline{6s^2 6p^6}$	8

Electron configuration Worksheet

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1. Write the full electron configuration Aluminum. How many valence electrons are there?



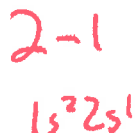
2. Write the full electron configuration of Argon. How many valence electrons are there?



3. Write the full electron configuration of Potassium. How many valence electrons are there?



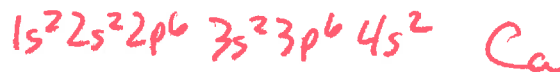
4. Write the electron configuration of Lithium using Kernal notation.



5. Write the electron configuration of Potassium using Kernal notation.



6. What is the full electron configuration of the atom with a configuration of 2-8-8-2? What element is this?



7. Write the full electron configuration of the atom with a configuration of 2-8-13-1? What element is this?



8. Which electron configuration represents an excited state of Magnesium?

a) 2-6-2

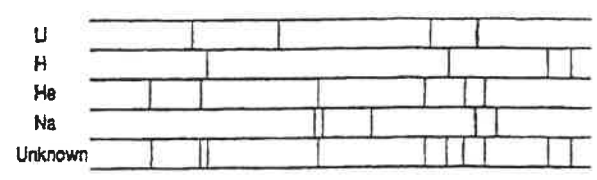
c) 2-8-2

b) 2-8-0-1-1

d) 3-7-1-1

- A K atom *differs* from a K^+ ion in that the K atom has one
 - more electron
 - less electron
 - more proton
 - less proton
- Which element has atoms with only one completely filled principal energy level?
 - N
 - P
 - As
 - Sb
- What is the maximum number of electrons that may be present in the second principal energy level of an atom?
 - 8
 - 2
 - 18
 - 32
- The principal quantum number of the outermost electron of an atom in the ground state is $n = 3$. What is the total number of occupied principal energy levels contained in this atom?
 - 1
 - 2
 - 3
 - 4
- In an aluminum atom in the ground state, the energy level which contains the most electrons has the principal quantum number
 - 1
 - 2
 - 3
 - 4
- The maximum number of electrons that can occupy a principal energy level (n) of an atom is equal to
 - n^2
 - $2n^2$
 - $n + 2$
 - $n^2 + 2$
- An atom contains a total of 25 electrons. When the atom is in the ground state, how many different principal energy levels will contain electrons?
 - 1
 - 2
 - 3
 - 4
- An atom of which element in the ground state contains electrons with a principal quantum number (n) of 4?
 - Kr
 - Ar
 - Ne
 - He
- When electrons in an atom in an excited state fall to lower energy levels, energy is
 - absorbed, only
 - released, only
 - neither released nor absorbed
 - both released and absorbed

- As an electron in a hydrogen atom moves from the second principal energy level to the first principal energy level, the energy of the atom
 - decreases
 - increases
 - remains the same
- As an electron in an atom moves from the ground state to an excited state, the potential energy of the electron
 - decreases
 - increases
 - remains the same
- Electron X can change to a higher energy level or a lower energy level. Which statement is true of electron X?
 - Electron X emits energy when it changes to a higher energy level.
 - Electron X absorbs energy when it changes to a higher energy level.
 - Electron X absorbs energy when it changes to a lower energy level.
 - Electron X neither emits nor absorbs energy when it changes energy level.
- The characteristic bright-line spectrum of an element is produced when electrons
 - are given off as beta particles
 - are gained from another atom
 - move to higher energy levels
 - fall back to lower energy levels
- The diagram below shows the characteristic spectral line patterns of four elements. Also shown are spectral lines produced by an unknown substance.



- Which pair of elements is present in the unknown?
- lithium and sodium
 - sodium and hydrogen
 - lithium and helium
 - helium and hydrogen
- Which principal energy level change by the electron of a hydrogen atom will cause the greatest amount of energy to be absorbed?
 - $n = 2$ to $n = 4$
 - $n = 2$ to $n = 5$
 - $n = 4$ to $n = 2$
 - $n = 5$ to $n = 2$

1. Which principal quantum number is assigned to the valence electrons of a carbon atom in the ground state?
 (1) 1 (3) 3
 (2) 2 (4) 4
2. Which ion contains the same total number of electrons as Cl^- ?
 (1) Mg^{2+} (3) S^{2-}
 (2) Na^+ (4) Br^-
3. What is the total number of valence electrons in an atom of xenon?
 (1) 0 (3) 8
 (2) 2 (4) 18
4. Which ion has the same electron configuration as an H^- ion?
 (1) Li^+ (3) F^-
 (2) K^+ (4) Cl^-
5. What is the electron configuration for Be^{2+} ions?
 (1) 2-1 (3) 1
 (2) 2-2 (4) 2
6. When a calcium atom loses its valence electrons, the ion formed has an electron configuration which is the same as an atom of
 (1) Cl (3) K
 (2) Ar (4) Sc
7. The characteristic bright-line spectrum of an atom is produced when
 (1) nuclei of atoms undergo fusion
 (2) nuclei of atoms undergo fission
 (3) electrons move from lower to higher energy levels
 (4) electrons move from higher to lower energy levels
8. Which species has the same electron configuration as a Cl^- ion?
 (1) Br^- (3) S
 (2) F^- (4) Ar
9. In which pair of elements do the nuclei of the atoms contain the same number of neutrons?
 (1) $_{16}^{32}\text{S}$ and $_{17}^{35}\text{Cl}$ (3) $_{7}^{14}\text{N}$ and $_{8}^{16}\text{O}$
 (2) $_{11}^{23}\text{Na}$ and $_{12}^{24}\text{Mg}$ (4) $_{3}^7\text{Li}$ and $_{4}^9\text{Be}$
10. An experiment in which alpha particles were used to bombard thin sheets of gold foil led to the conclusion that an atom is composed mostly of
 (1) empty space and has a small, negatively charged nucleus
 (2) empty space and has a small, positively charged nucleus
 (3) a large, dense, positively charged nucleus
 (4) a large, dense, negatively charged nucleus