

Electron Configurations Worksheet

Chemistry

- 1) What does each letter and number mean in the following notation? $3p^6$
- 2) Determine the following for the 4th electron shell ($n=4$) of an atom:
 - a) Number of subshells it contains
 - b) The designation used to describe each of the first three subshells
 - c) The number of orbitals in each of the first three subshells.
 - d) The maximum number of electrons that can occupy the 4th shell.
 - e) The maximum number of electrons that can occupy each of the first three subshells.
- 3) Fill in the numerical value(s) that correctly complete(s) each of the following statements.
 - a) A 5f subshell holds a maximum of _____ electrons.
 - b) A 4s orbital holds a maximum of _____ electrons.
 - c) The maximum number of electrons in the third electron shell is _____.
 - d) The fourth shell contains _____ subshells, _____ orbitals, and a maximum of _____ electrons.
- 4) Give the maximum number of electrons that can occupy each of the following units.
 - a) 2p subshell
 - b) 5d orbital
 - c) 3s orbital
 - d) 5d subshell
 - e) fifth shell
- 5) Write an orbital-filling diagram for the outer energy level of the following elements by drawing an arrow for each electron:
 - a) Argon _____
 s p_x p_y p_z
 - b) Sulfur _____
 s p_x p_y p_z
 - c) Calcium _____
 s p_x p_y p_z
 - d) Oxygen _____
 s p_x p_y p_z
- 6) Write the electronic configuration for germanium.
- 7) Write the electronic configuration for iron.
- 8) The electron configuration for a neutral atom ends in $4s^23d^8$.
 - a) What is its atomic number?

- b) How many orbitals are NOT completely filled?
- c) Name the atom.
- 9) The electron configuration for a neutral atom ends in $3s^2$.
 - a) What is its atomic number?
 - b) How many orbitals are NOT completely filled?
 - c) Name the atom.
- 10) Name the elements whose electron configuration is:
 - a) $1s^22s^22p^63s^23p^64s^23d^3$
 - b) $1s^22s^22p^63s^23p^64s^23d^{10}4p^65s^24d^9$
 - c) $1s^22s^22p^63s^23p^64s^23d^{10}4p^65s^24d^{10}5p^66s^2$
 - d) $[\text{Xe}] 6s^24f^{14}5d^6$
 - e) $[\text{Rn}] 7s^25f^{11}$
- 11) Determine which of the following electron configurations are not valid, and tell what is wrong with them:
 - a) $1s^22s^22p^63s^23p^64s^24d^{10}4p^5$
 - b) $1s^22s^22p^63s^23d^{10}$
 - c) $[\text{Ra}] 7s^25f^8$
 - d) $[\text{Kr}] 4s^23d^{10}4p^5$

An **ion** is an element that has a positive or negative charge because it has lost or gained one or more electrons. Positively-charged ions are also called **cations**; negatively charged ions are **anions**. A **polyatomic ion** is a bound group of elements that has a positive or negative charge.

Based on this information, answer the following:

- 12) Name the -1 ion that has an electron configuration of $[\text{Kr}]$.
- 13) Name the -2 ion that has an electron configuration of $[\text{Ar}]$.
- 14) Name the $+1$ ion that has an electron configuration of $[\text{Ar}]$.
- 15) Name the $+1$ ion that has an electron configuration of $[\text{Ne}]$.
- 16) Name the $+3$ ion that has an electron configuration of $[\text{Ne}]$.
- 17) Determine the electron configuration for each of the following ions:
 - a) S^{2-}
 - b) Se^{2-}
 - c) Mg^{2+}
 - d) Ca^{2+}