

Practice - Electron Configurations & Orbital Diagrams

If the statement is true, write "true". If it is false, change the underlined word or words to make the statement true.

Key
11-12

True

1. The Pauli exclusion principle states that an orbital can hold a maximum of two electrons.

electrons

2. The sum of the superscripts in an electron configuration represents the total number of neutrons in the atom.

lowest

3. The Aufbau principle states that electrons are added one at a time to the highest energy orbitals available until all the electrons of the atom have been accounted for.

True

4. An orbital diagram uses arrows to represent the spin of the electrons.

most

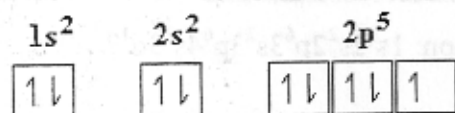
5. The ground state is the least stable energy state of an atom.

True

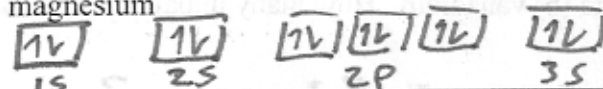
6. According to Hund's rule, electrons occupy equal energy orbitals so that a maximum number of unpaired electrons results.

Write the orbital diagram for each of the following elements.

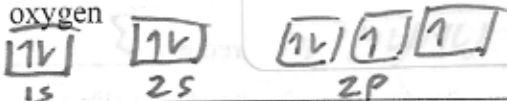
Ex: fluorine



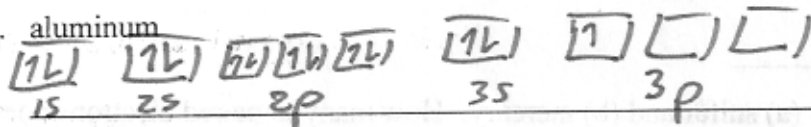
7. magnesium



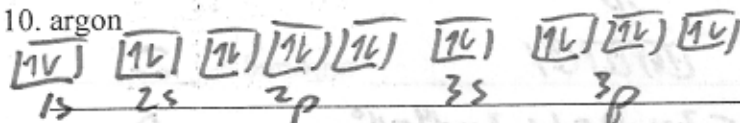
8. oxygen



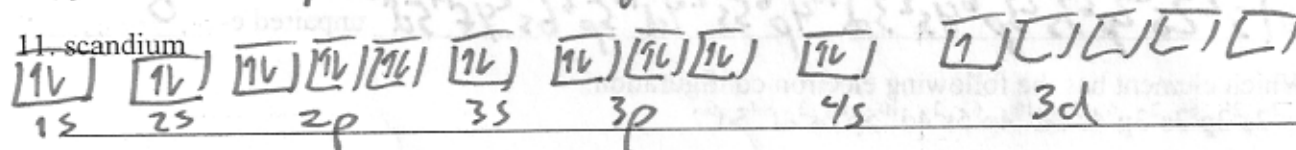
9. aluminum



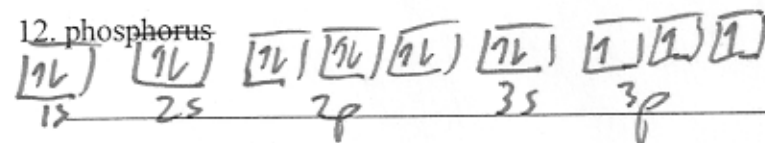
10. argon



11. scandium



12. phosphorus



13. Write out the **electron configurations** for (a) potassium and (b) cobalt. How many unpaired electrons does each possess?

Ex: $1s^2 2s^2 2p^6 3s^2 3p^4 4s^1$

$\boxed{\uparrow}$

unpaired e- 1

b. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$ $\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow}$ unpaired e- 3

14. Which element has the following electron configuration: $1s^2 2s^2 2p^3$?

Nitrogen (N)

15. Write out the electron configurations for (a) silicon and (b) lithium. How many unpaired electrons does each possess?

a. $1s^2 2s^2 2p^6 3s^2 3p^2$

$\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}$

unpaired e- 2

b. $1s^2 2s^1$

$\boxed{\uparrow}$

unpaired e- 1

16. Which element has the following electron configuration: $1s^2 2s^2 2p^6 3s^2 3p^3$?

Phosphorus (P)

17. Write out the electron configurations for (a) iridium and (b) selenium. How many unpaired electrons does each possess?

a. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^7$ unpaired e- 3

b. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^4$ $\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow}$ unpaired e- 2

18. Which element has the following electron configuration: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^1$?

Scandium (Sc)

19. Write the electron configurations for (a) bismuth and (b) vanadium. How many unpaired electrons does each possess?

a. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^3$ unpaired e- 3

b. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^3$ $\boxed{\uparrow}\boxed{\uparrow}\boxed{\uparrow}$ unpaired e- 3

20. Which element has the following electron configuration: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10}$?

Cadmium (Cd)

21. Write the electron configurations for (a) sulfur and (b) mercury. How many unpaired electrons does each possess?

a. $1s^2 2s^2 2p^6 3s^2 3p^4$ $\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow}$ unpaired e- 2

b. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10}$ unpaired e- 0

22. Which element has the following electron configuration:

$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^6$

Osmium (Os)