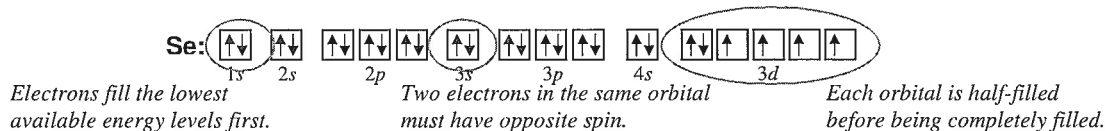


Orbital Diagrams

Chem Worksheet

Name _____

An orbital diagram uses boxes with arrows to represent the electrons in an atom. Each box in an orbital diagram represents an orbital. Orbitals have a capacity of two electrons. Arrows are drawn inside the boxes to represent electrons. Two electrons in the same orbital must have opposite spin so the arrows are drawn pointing in opposite directions. The following is an orbital diagram for selenium.

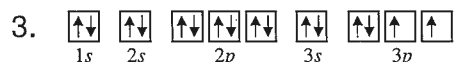
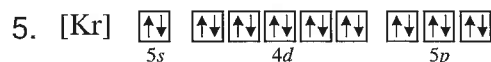


In writing an orbital diagram the first step is to determine the number of electrons. Normally this is the same as the number of protons, which is known as the atomic number. Next the boxes are drawn for the orbitals. Arrows are drawn in the boxes starting from the lowest energy sublevel and working up. This is known as the **Aufbau rule**. The **Pauli exclusion principle** requires that electrons in the same orbital have opposite spin. **Hund's rule** states that orbitals in a given sublevel are half-filled before they are completely filled.

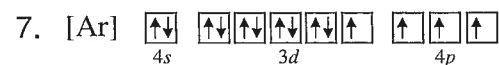
Boxes drawn for various sublevels		
<i>s</i> sublevel:	<input type="checkbox"/>	1 orbital
<i>p</i> sublevel:	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	3 orbitals
<i>d</i> sublevel:	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	5 orbitals
<i>f</i> sublevel:	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	7 orbitals



Write the name and symbol for the elements with the following orbital diagrams.



There is an error with each of the following orbital diagrams. Explain the error.



Write orbital diagrams for the following. You may abbreviate using a noble gas.

9. hydrogen

15. carbon

10. boron

16. cobalt

11. sodium

17. platinum

12. krypton

18. plutonium

13. chromium

19. oxygen

14. phosphorus

20. potassium

Electron Configuration Practice Worksheet

In the space below, write the unabbreviated electron configurations of the following elements:

- 1) sodium _____
- 2) iron _____
- 3) bromine _____
- 4) barium _____
- 5) neptunium _____

In the space below, write the abbreviated electron configurations of the following elements:

- 6) cobalt _____
- 7) silver _____
- 8) tellurium _____
- 9) radium _____
- 10) lawrencium _____

Determine what elements are denoted by the following electron configurations:

- 11) $1s^2 2s^2 2p^6 3s^2 3p^4$ _____
- 12) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1$ _____
- 13) $[\text{Kr}] 5s^2 4d^{10} 5p^3$ _____
- 14) $[\text{Xe}] 6s^2 4f^{14} 5d^6$ _____
- 15) $[\text{Rn}] 7s^2 5f^{11}$ _____

Determine which of the following electron configurations are not valid:

- 16) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4d^{10} 4p^5$ _____
- 17) $1s^2 2s^2 2p^6 3s^3 3d^5$ _____
- 18) $[\text{Ra}] 7s^2 5f^8$ _____
- 19) $[\text{Kr}] 5s^2 4d^{10} 5p^5$ _____
- 20) $[\text{Xe}]$ _____