

Electrons Configurations Homework

Name: Key

A. Use the patterns within the periodic table to draw orbital diagrams (with arrows) and write longhand electron configurations for the following atoms.

Symbol	# e	Orbital Diagram (use arrows) and Longhand Electron Configuration
Mg	12	$\begin{array}{cccccc} \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow \\ 1s & 2s & & 2p & & 3s \end{array}$ $1s^2 2s^2 2p^6 3s^2$
P	15	$\begin{array}{ccccccc} \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow & \uparrow & \uparrow \\ 1s & 2s & & 2p & & 3s & & 3p & \end{array}$ $1s^2 2s^2 2p^6 3s^2 3p^3$
V	23	$\begin{array}{ccccccccccc} \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow & \uparrow & \uparrow & - & - \\ 1s & 2s & & 2p & & 3s & & 3p & & 4s & & & 3d & & \end{array}$ $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^3$
Ge	32	$\begin{array}{ccccccccccc} \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow & \uparrow & - \\ 1s & 2s & & 2p & & 3s & & 3p & & 4s & & 3d & & 4p & & \end{array}$ $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^2$
Kr	36	$\begin{array}{ccccccccccc} \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow \\ 1s & 2s & & 2p & & 3s & & 3p & & 4s & & 3d & & & & & 4p & \end{array}$ $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$
O	8	$\begin{array}{cccc} \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow & \uparrow \\ 1s & 2s & & 2p & \end{array}$ $1s^2 2s^2 2p^4$

B. Use the patterns within the periodic table to write the shorthand electron configurations for the following elements.

Symbol	# e	Shorthand Electron Configuration
Ca	20	[Ar] 4s ²
Pb	82	[Xe] 6s ² 4f ¹⁴ 5d ¹⁰ 6p ²
F	9	[He] 2s ² 2p ⁵
U	92	[Rn] 7s ² 5f ⁴

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C. Which of the following "rules" is being violated in each electron configuration below? Explain your answer for each. *Hund's Rule, Pauli Exclusion Principle, Aufbau Principle*

- | | | |
|----|--|---|
| 1. | $\uparrow\downarrow$ $\uparrow\downarrow$ $\uparrow\downarrow$
1s 2s 2p | Hund's Rule - \uparrow \uparrow - |
| 2. | $\uparrow\downarrow$ $\uparrow\downarrow$ $\uparrow\downarrow\uparrow\downarrow\uparrow\downarrow$ $\uparrow\downarrow$ \uparrow \uparrow
1s 2s 2p 3s 3p | Aufbau Principle |
| 3. | $\uparrow\downarrow$ $\uparrow\downarrow$ $\uparrow\downarrow\uparrow\downarrow\uparrow\downarrow$ $\uparrow\uparrow$ $\uparrow\downarrow$ $\uparrow\downarrow$ \uparrow
1s 2s 2p 3s 3p | Pauli $\uparrow\downarrow$ opposite spins |
| 4. | $\uparrow\downarrow$ $\uparrow\downarrow$ $\uparrow\downarrow\uparrow\downarrow\uparrow\downarrow$ $\uparrow\downarrow$ $\uparrow\downarrow\uparrow\downarrow\uparrow\downarrow$ $\uparrow\downarrow\uparrow\downarrow\uparrow\downarrow\uparrow\downarrow$
1s 2s 2p 3s 3p \uparrow _{3d} | Aufbau Principle |
- 4s