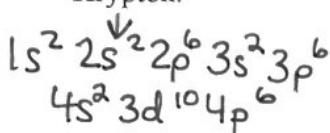


Modern Atomic Theory Practice

1. Shape characterizes different

- a. sublevels
- b. energy levels
- c. spins
- d. orbitals

2. Write the letters of the particles below which would be found in the same isoelectronic series as Krypton.



a. K^{1+}	<u>f. Br^-</u>
b. Ca^{2+}	g. Te^{2-}
c. Ga^{3+}	<u>h. Rb^{1+}</u>
d. Ge^{4+}	i. Pd^{2+}
<u>e. As^{3-}</u>	j. Zr^{2+}

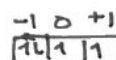
3. Which statements are consistent with the fact that the lithium ion has a 1^+ charge?

- ~~i. It has 1 p electron~~
- ~~ii. It has gained one electron~~
- ✓ iii. It has lost one electron
- ✓ iv. The change in its number of electrons promotes stability
- ✓ v. It is isoelectronic to helium

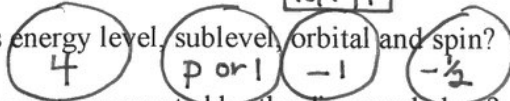
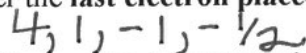
a. i and iii b. ii and iv c. i, iii, and v d. i, ii, and iii e. iii, iv, and v f. all of the above

4. Which element has the electron configuration $1s^2 2s^2 2p^3$?

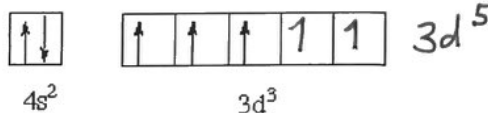
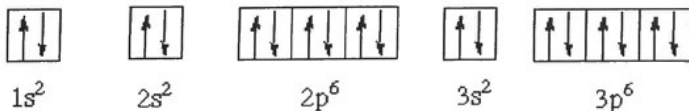
- a. Al b. C c. P d. N e. none of the choices



5. Consider the **last electron placed** in Se. What is its energy level, sublevel, orbital and spin?

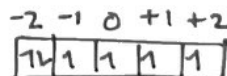
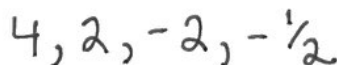
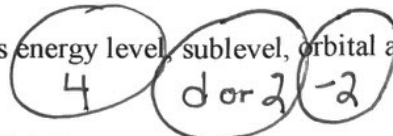
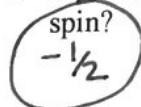


6. Which element has **two more** electrons than the element represented by the diagram below?



- a. Mn b. V c. Tc d. Cr e. none of the choices

7. Consider the last electron placed in ruthenium (Ru). What is its energy level, sublevel, orbital and spin?



19. An orbital shaped like this,  , is a p (s, p, d, or f) orbital.

2 lobes

d 4 lobes

f (8 lobes)

20. In orbital notation, what do the individual boxes represent? → orbitals

21. In orbital notation, what does an upward pointing arrow represent?

an electron that is spinning clockwise.
(We assume the 1st electron in the orbital is the one spinning cw)

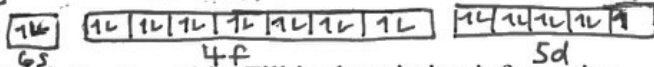
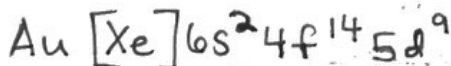
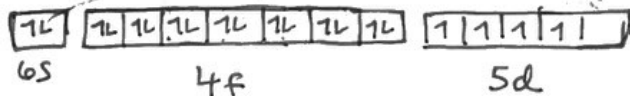
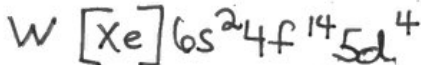
22. The Aufbau Principle sets rules for

- a. measuring an electron's location and momentum
- b. how electrons are distributed among orbitals
- c. how many electrons can occupy a single space
- d. how an atom is filled with electrons from the nucleus outward

23. The Pauli exclusion principle supports the idea that

- a. the last three electrons added to antimony are in different orbitals
- b. the fifth electron added to nitrogen cannot be measured for its position in space and its momentum simultaneously
- c. the quantum numbers for lithium's first and second electrons are different
- d. the third electron added to chlorine has more energy than its second electron
- e. none of the above

24. Write the noble gas electron configurations for tungsten and gold and show the orbital notation for their 6s, 4f, and 5d orbitals.

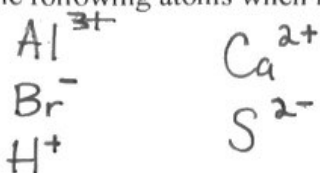


25. Look at the following table. Fill in the missing information.

Name of Particle	Atomic Number	Electron Configuration	Charge on Particle
Oxide ion (O ²⁻) ^{10 electrons}	8 protons	1s ² 2s ² 2p ⁶ → 10 e ⁻ s	-2
^{Sodium ion} Na ⁺	11 protons	1s ² 2s ² 2p ⁶ → 10 e ⁻ s	+1
Ar argon atom	18 protons	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶	0
^{18 electrons} Phosphide ion (P ³⁻)	15 protons	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶	-3

26. Write the symbol for each of the following atoms when it becomes an ion.

- A. aluminum atom
- B. bromine atom
- C. hydrogen atom
- D. calcium atom
- E. sulfur atom



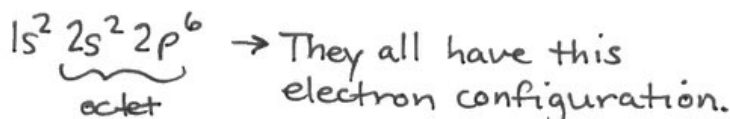
27. What determines the number of electrons gained or lost by an atom?

An atom becomes an ion by gaining or losing enough electrons to make an octet in the highest energy level.

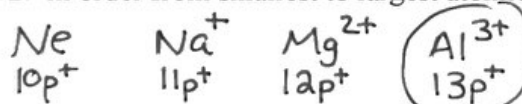
28. The following particles constitute an isoelectronic series. What does this mean? Write the electron configuration for particles.



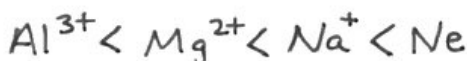
→ They all have the same # of e's



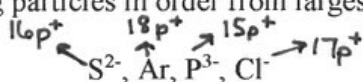
29. Place the particles in #29 in order from smallest to largest atomic radius. Explain why you placed them in this order.



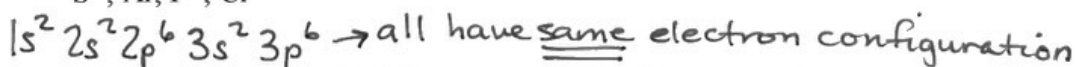
→ The more p^+ , the smaller the particle will be!!



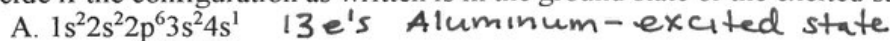
30. Place the following particles in order from largest to smallest atomic radius. Explain why you placed them in this order.



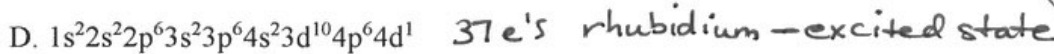
most p^+
 so will
 be
 smallest →



31. For each of the following electron configurations of neutral atoms, determine the name of the element and decide if the configuration as written is in the ground state or the excited state.



exception to the normal filling order



32. What was the **main contribution** of Bohr to the development of the atomic model? (He had experimental evidence to support this idea.)

Bohr discovered that electrons are in Energy Levels which are different distances from the nucleus.