

TEST 3 (of 3)

Show all of your work. Students should use significant figures and express their answers in scientific notation.

1. What is an electron configuration?

2. (a) Write the full electron configuration for sulfur.

(b) Write the full orbital diagram for sulfur.

(c) Write the abbreviated electron configuration for sulfur.

3. (a) Give an example of an element which loses electrons in a chemical reaction and write a balanced chemical reaction for the loss of e^- from the neutral atom.

(b) Give an example of an element which gains electrons in a chemical reaction and write a balanced chemical reaction for the gain of e^- by the neutral atom.

4. Potassium is a highly reactive metal while argon is an inert gas.
(a) Write their electronic configurations.

(b) Complete the following explanation:

Argon has a completely filled **s / p / d** sublevel giving it stability. Potassium has 1 e^- in the **4s / 4p / 4d** sublevel and can easily lose this e^- so it has a **LOW / HIGH** first ionization energy. It therefore loses the **4s / 4p / 4d** e^- to achieve a **STABLE/ UNSTABLE** configuration

5. Use orbital diagrams for silver and zinc to explain why elemental silver is attracted to an external magnetic field (paramagnetic) and elemental zinc is not (diamagnetic).

6. (a) According to Lewis theory, what is an ionic bond? What is a covalent bond?
- (b) Within a covalent Lewis structure, what is the difference between a lone pair and a bonding pair of electrons?
7. Write a Lewis structure for each of the following molecules:
- (a) H_2O (b) NH_3
8. Write a Lewis structure that obeys the octet rule for each of the following ions. Include resonance structures if necessary and assign formal charges to each atom:
- (a) NH_4^+ (b) CO_3^{2-}
9. Write an appropriate Lewis structure for each of the following compounds. Make certain to distinguish between ionic and covalent compounds.
- (a) K_2S (b) PBr_3
10. Draw a Lewis structure for nitric acid. Include all 3 resonance structures by alternating the double bond among the three oxygen atoms. Use formal charge to determine which of the resonance structures is most important to the structure of nitric acid.

BONUS:

The metalloids, which form a diagonal band separating the metals from the non-metals share similar characteristics.

There are other instances in which elements diagonal to each other in the periodic table (e.g. such as Li and Mg) have comparable metallic character. Suggest an explanation for this observation.