

Exam #5: Electron Configuration, Periodic Trends and Lewis Dot Structures

1. State the periodic law.

When elements are arranged in order of *increasing atomic number*, there is a periodic pattern in their physical and chemical properties.

2. What does atomic radius describe? What is the increasing trend for atomic radius?

Size of the atom

down and to the left

3. What is ionization energy and its increasing trend? What is electronegativity and its increasing trend?

Energy required to remove/give away e^-

Ability to attract/steal e^-

4. Draw the Lewis Dot Structures for the following elements:



ELEMENT	# of valence electrons	Lewis Dot Structure	Oxidation #
Aluminum	3	Al:	+3
Barium	2	Ba:	+2
Carbon	4	•C:	+/- 4
Fluorine	7	•F•	-1
Lithium	1	Li•	+1
Oxygen	6	•O•	-2

5. Put the following elements in order by increasing electronegativity:
- sulfur, oxygen, neon, aluminum.**

Aluminum, sulfur, oxygen, neon

6. Circle the atom in each pair that is the
- largest in size**
- .

a. Al or B

d. O or F

b. Na or Al

e. Br or Cl

c. S or O

f. Mg or Ca

7. Circle the atom in each pair that
- requires MORE energy to remove valence electrons**
- .

a. Li or Be

d. P or Ar

b. Ca or Ba

e. Cl or Si

c. Na or K

f. Li or K

8. Classify each as a
- halogen, noble gas**
- , or other
- non-metal**
- based on its position on the periodic table:

a. Nitrogen – non-metal

d. Sulfur – non-metal

b. Fluorine – halogen

e. Chlorine – halogen

c. Xenon – noble gas

f. Krypton – noble gas

9. Circle the atom in each pair that has a **WEAKER** attraction for valence electrons.

a. **Ca** or Ga

d. **Ba** or Sr

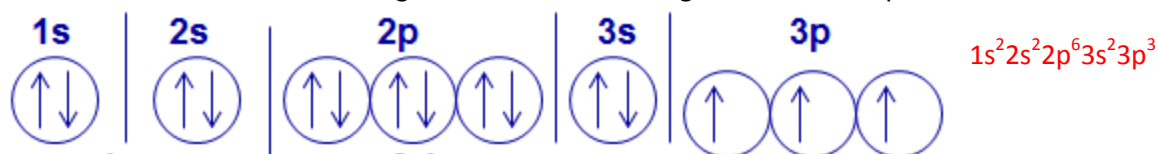
b. Br or **As**

e. Cl or **S**

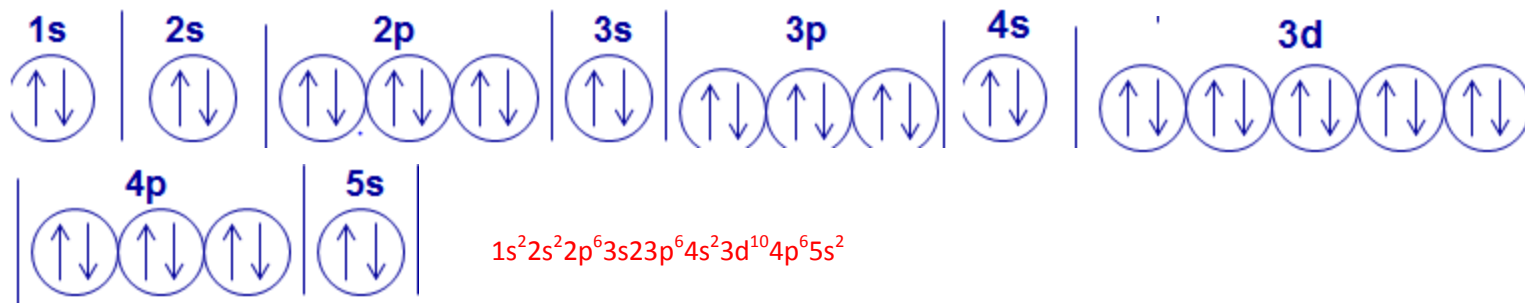
c. **Li** or O

f. O or **S**

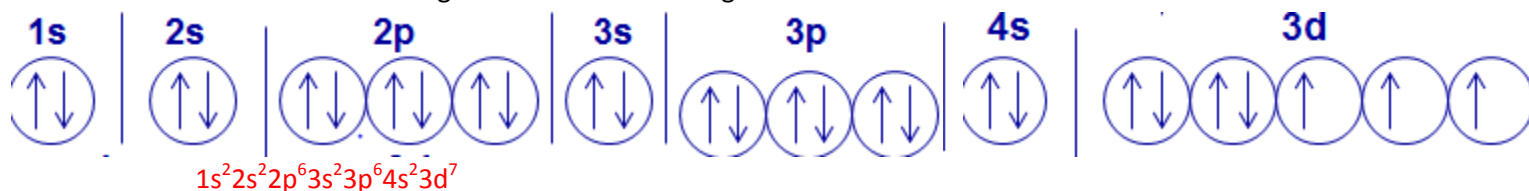
10. Write the orbital diagram and electron configuration for Phosphorus:



11. Write the orbital diagram and electron configuration for Strontium:



12. Write the orbital diagram and electron configuration for Cobalt:



13. Classify each as **alkali metals**, **alkaline earth metals**, **transition metals** or **metalloids** based on its position on the periodic table:

a. Potassium – **alkali metal**

d. Strontium – **alkaline earth metal**

b. Antimony (Sb) – **metalloid**

e. Gold – **transition metal**

c. Zinc – **transition metal**

f. Boron – **metalloid**

14. Explain why Sodium is very reactive while Krypton is not reactive at all. (think about oxidation #'s and valence electrons)

Sodium is very reactive because in order for it to be stable, it only needs to give away ONE electron; Krypton is not reactive at all because it is already one of the most stable elements having 8 valence electrons and it doesn't need to give away or steal any electrons.

15. What atom is a non-metal, LIQUID, halogen that can be found in the period 4?

Bromine

16. What atom is a solid, alkali metal with the largest atomic radii?

Francium

17. What atom is a non-metal, noble gas with two valence electrons?

Helium

18. How are Strontium and Calcium similar?

They are in the same family (alkaline earth metals); they have 2 valence electrons.

19. Which atom has a stronger attraction to electrons: **Chlorine** or Phosphorus?

20. Which atom requires less energy to remove valence electrons: **Calcium** or Aluminum?