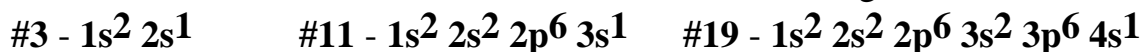


WS - Chapter 14 - electrons and The Periodic table 2010

- ___ 1. In general, the atomic **mass** of elements **increases** as the atomic **number increases**.
Which of these pairs of **consecutive** elements is an **exception** to this generalization?
a) Li & Be b) N & O c) Ar & K d) Ni & Cu
2. Due to such exceptions, elements on the modern P.T. are ordered by their atomic _____
- 3 – 7. Match each Electron Configuration with a region on the periodic table:**
- ___ 3. *s* and nearby *d* sublevel contain electrons A. Noble Gases
___ 4. outermost *s* and nearby *f* sublevels contain electrons B. Representative Elements
___ 5. outermost *s* and *p* sublevels are completely filled C. Transition Metals
___ 6. Outermost *s* and *p* sublevels are only partly filled D. Inner Transition Metals
___ 7. For these, the **group number** equals the **number** of **valence s** and **p** electrons
8. **Nitrogen** is a nonmetallic **gas**, while **Bismuth** is a solid **metal**. However, Nitrogen and Bismuth are **both** included in **Group 5A** because they have ___ **valence electrons** .
9. The **Noble Gases** are **unreactive**, because their _____
10. Name the **groups** whose elements have the following valence (outer) electron configuration:
a) s^1 - Group ___ b) s^2p^5 - Group ___ c) s^2p^6 - Group ___
11. How many **valence electrons** are found in each of the following?
a) the elements of the oxygen family? _____ b) the element in Group 3A, Period 5 - _____
c) the element with the electron configuration $1s^2 2s^2 2p^5$ - _____
12. See text, p. 398-400, Figure 14.8, p. 399 and Fig 14.10, p. 401
a) As you go **down** a **group**, the **atomic radius** _____, because the number of _____ levels increases and the outermost orbital is _____.
b) As you go from left to right across a **period**, the **atomic radius** _____: energy level remains the **same**, but **increasing** nuclear charge _____ the electrons closer.
c) Group ___A atoms all have very **large** radii, while Group ___A all have **small** radii.
13. See Table 14.1, p. 402 and Fig 14.12, p. 403 a) The **first** ionization energy for Group **IA** is very _____, while the **second** ionization energy for Group **IA** is very _____.
b) Group ___A has the **highest first** ionization energy of all (doesn't want to let go at all!)
c) **K** has a **lower first i.e.** than **Li**, because its outer electron is _____ the nucleus.
14. Identify the two elements below (write the **symbol**), using the information listed below:
a) Element **X** - reacts with **sodium** to form Na_2X ; located in **Period 2** = _____
b) Element **Y** - reacts with **oxygen** to form Y_2O ; **largest atomic radius** in Period **4**;

lowest ionization energy in Period 4 = _____

15. The atomic numbers listed below have these electron configurations:



- How many **valence** electrons does each atom have? _____
- These elements are **all** located in **Group** ____**A** on the periodic table.
- You should expect to find out that the **chemical properties** of these elements are all _____ (Hint: British guys and bathtub)
- What “family” name is given to this group of elements? _____ Metals

16. The atomic numbers listed below have these electron configurations:



- Comparing these three electron configurations, what do they have in common?
They all have _____.
- These elements are **all** located in **Group** ____**A** on the periodic table.
- You should expect to find out that the **chemical properties** of these elements are all _____ (but **not** like the elements in **IA**).
- This “family” is named the _____, because they form many common **salts**.

17. Calcium (Ca) element 20, forms Ca^{2+} as an ion by **losing two electrons**.

The electron configuration for the **neutral Ca atom** is $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$.

Complete the electron configuration for the Ca^{2+} ion: $1s^2 2s^2 2p^6$ _____

18. Sulfur (S) element 16, forms S^{2-} as an ion by **gaining two electrons**.

The electron configuration for the **neutral S atom** is $1s^2 2s^2 2p^6 3s^2 3p^4$.

Complete the electron configuration for the S^{2-} ion: $1s^2 2s^2 2p^6$ _____

19. How do your answers for **17** and **18** compare? They should be the **same**, because **both** the Calcium and Sulfur **ions** are trying to achieve an **inert gas configuration** (in this case, the element _____). (Their **ions** are **isoelectronic** with this element’s **neutral** atom.)

20. Check the **Ion Charges** list on **page 143** if you aren’t sure how to answer the following:

- Group **IA** metals form ions with a _____ charge.
- Group **IIA** metals form ions with a _____ charge.
- Group **IIIA** metals form ions with a _____ charge.
- Group **VIA** elements form ions with a _____ charge.
- Group **VIIA** elements form ions with a _____ charge.
- What **charge** would Group **VIIIA** elements have? _____

Bonus: Ions of groups **3B - 2B** (transition metals) have **variable** charges. What is different about their **electron configurations** is that their ___ orbitals are just starting to fill in. Sometimes, these ___ electrons are **unstable** and will act as additional **valence** electrons.