Review: Periodic Trends - Bonding

SCH3U_2013-2014

1. Which among the following is the **largest** atom?

   a) F b) Ar c) Al d) N e) B

2. The first five ionization energies, (kJ mol^{-1}), for a certain element are shown below.

   E_1 = 400 E_2 = 620 E_3 = 9800 E_4 = 12200 E_5 = 15800

   Which family of elements would this element be in?
   a) IA b) IIA c) IIIA d) IVA e) VA

3. The first three ionization energies for two elements, X and Y, are

   Ionization Energies (kJ mol^{-1})

	First	Second	Third
X	520	7,300	11,800
Y	1,086	2,350	4,620

   Which pair of elements represents X and Y?

   A. $_{3}Li$ and $_{6}C$ B. $_{4}Be$ and $_{8}O$ C. $_{2}He$ and $_{4}Be$ D. $_{8}O$ and $_{16}S$

4. The term electronegativity difference refers to the fact that:
   a) an electric current is a stream of negative particles called electrons
   b) some elements conduct electricity while others do not
   c) it requires energy to remove electrons from neutral atoms
   d) the attraction for electrons in a bond formed between two atoms is uneven
   e) the electronegativity of an element changes with temperature

5. Which one of the elements below has the **highest** electronegativity?
   a) Ne b) S c) I d) Li e) Ba

5. How do chemical reactivities of the alkali metals and the halogens vary down the families?

A. They both increase.

B. The reactivities of the alkali metals increase but those of the halogens decrease.

C. The reactivities of the alkali metals decrease but those of the halogens increase.

D. They both decrease

6. Elements X and Y are in the same chemical family. Element X has a first ionization energy of 7.646 eV. Element Y has a first ionization energy of 5.695 eV. Which is more reactive?

a. X
b. Y
c. They are equally reactive.
d. not enough information
e. X will be more reactive provided it reacts with another member of its family.

7. The concept of multiple covalent bonds is used to explain the molecular formula of

a. O_2
b. NaCl
c. C_2H_6
d. F_2
e. NaOH

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8. If XF_2 is the correct formula for a metallic fluoride, then the formula for the oxide of X is

a. X_2O
b. XO
c. XO_4
d. XO_2
e. X_2O_2

9. How does atomic radius change from left to right across a period in the periodic table?

a. It increases.
b. It decreases.
c. It stays the same.
d. It increases and then decreases.

10. What is the shape of a molecule of carbon tetrachloride, CCl_4?

a. linear
b. trigonal planar
c. trigonal pyramidal
d. tetrahedral

11. The CCl_4 molecule is nonpolar. This is because:

a) the effects of the bond dipoles cancel
b) carbon and chlorine are in different period of the periodic table
c) the electronegativity difference between C and Cl is very small
d) the C - Cl bonds are nonpolar
e) all the C - Cl bonds have the same bond energy

12. A molecule of NH_3 (ammonia) is:

a) linear and polar
b) V-shaped and polar
c) tetrahedral and non polar
d) pyramidal and polar

13. Which series is arranged in order of **increasing** radius?

A. $Ca^{2+} < Cl^{-} < K^{+}$

B. $K^{+} < Ca^{2+} < Cl^{-}$

C. $Ca^{2+} < K^{+} < Cl^{-}$

D. $Cl^{-} < K^{+} < Ca^{2+}$

14. Which properties of Period 3 elements increase from sodium to argon?

I. Nuclear charge

II. Atomic radius

III. Electronegativity

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

15. Which equation represents the **first** ionization energy of fluorine?

A. $F(g) + e^- \rightarrow F^-(g)$

B. $F^-(g) \rightarrow F(g) + e^-$

C. $F^+(g) \rightarrow F(g) + e^-$

D. $F(g) \rightarrow F^+(g) + e^-$

16. Which equation represents the **third** ionization energy of an element M?

A. $M^+(g) \rightarrow M^{4+}(g) + 3e^-$

B. $M^{2+}(g) \rightarrow M^{3+}(g) + e^-$

C. $M(g) \rightarrow M^{3+}(g) + 3e^-$

D. $M^{3+}(g) \rightarrow M^{4+}(g) + e^-$

17. Which statement about electronegativity is correct?

A. Electronegativity decreases across a period.

B. Electronegativity increases down a group.

C. Metals generally have lower electronegativity values than non-metals.

D. Noble gases have the highest electronegativity values.

18. Which factors lead to an element having a **low** value of first ionization energy?

I. large atomic radius

II. high number of occupied energy levels

III. high nuclear charge

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

Answers: Review: Periodic Trends – Bonding

1	**C**
2	**B**
3	**A**
4	**D**
5	**B**
6	**B**
7	**A**
8	**B**
9	**B**
10	**D**
11	**A**
12	**D**
13	**C**
14	**B**
15	**D**
16	**B**
17	**C**
18	**A**