Chapter 8 – Chapter 10 Practice Problems

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1. What is the electron configuration for Br?

   A. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^5$
   D. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 4d^{10}\ 4p^5$
   C. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^5$
   D. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 5p^5$

2. What is the orbital diagram for oxygen, and how many unpaired electrons does it have?

   A. $\frac{[\uparrow\downarrow]}{1s}\ \frac{[\uparrow\downarrow]}{2s}\ \frac{[\uparrow\downarrow][\uparrow\downarrow]}{2p}$, 2 unpaired electrons
   B. $\frac{[\uparrow\downarrow]}{1s}\ \frac{[\uparrow\downarrow]}{2s}\ \frac{[\uparrow\downarrow][\uparrow\downarrow][\uparrow]}{2p}$, 1 unpaired electrons
   C. $\frac{[\uparrow\downarrow]}{1s}\ \frac{[\uparrow\downarrow]}{2s}\ \frac{[\uparrow\downarrow][\uparrow][\uparrow]}{2p}$, 2 unpaired electrons
   D. $\frac{[\uparrow\downarrow]}{1s}\ \frac{[\uparrow\downarrow]}{2s}\ \frac{[\uparrow\downarrow][\uparrow\downarrow][\uparrow\downarrow]}{2p}$, 0 unpaired electrons

3. What is the electron configuration of Oganesson (Og) according to the periodic table? How many valence electrons does it have?

   A. $[Rn]\ 7s^2\ 4f^{14}\ 5d^{10}\ 7p^6$, 6 valence electrons
   B. $[Rn]\ 7s^2\ 5f^{14}\ 6d^{10}\ 7p^6$, 8 valence electrons
   C. $[Rn]\ 6s^2\ 5f^{14}\ 5d^{10}\ 6p^6$, 6 valence electrons
   D. $[Rn]\ 7s^2\ 4f^{14}\ 6d^{10}\ 7p^6$, 8 valence electrons

4. Which element has the largest atomic radius, and which has the **greatest** effective nuclear charge difference out of the pairs listed?

   A. Na has the largest radius; Al has the greatest Z_{eff}.
   B. Al has the largest radius; Na has the greatest Z_{eff}.
   C. Mg has the largest radius; Al has the greatest Z_{eff}.

D. Na has the largest radius; Mg has the greatest Z_{eff}.

5. What is the orbital diagram for Co^{3+} and is it diamagnetic or paramagnetic?

A. $\underset{1s}{[\uparrow\downarrow]}\ \underset{2s}{[\uparrow\downarrow]}\ \underset{2p}{[\uparrow\downarrow][\uparrow\downarrow][\uparrow\downarrow]}\ \underset{3s}{[\uparrow\downarrow]}\ \underset{3p}{[\uparrow\downarrow][\uparrow\downarrow][\uparrow\downarrow]}\ \underset{4s}{[\uparrow\downarrow]}\ \underset{3d}{[\uparrow\downarrow][\uparrow\downarrow][][][]}$, Paramagnetic
B. $\underset{1s}{[\uparrow\downarrow]}\ \underset{2s}{[\uparrow\downarrow]}\ \underset{2p}{[\uparrow\downarrow][\uparrow\downarrow][\uparrow\downarrow]}\ \underset{3s}{[\uparrow\downarrow]}\ \underset{3p}{[\uparrow\downarrow][\uparrow\downarrow][\uparrow\downarrow]}\ \underset{4s}{[\uparrow\downarrow]}\ \underset{3d}{[\uparrow][\uparrow][\uparrow][\uparrow][]}$, Diamagnetic
C. $\underset{1s}{[\uparrow\downarrow]}\ \underset{2s}{[\uparrow\downarrow]}\ \underset{2p}{[\uparrow\downarrow][\uparrow\downarrow][\uparrow\downarrow]}\ \underset{3s}{[\uparrow\downarrow]}\ \underset{3p}{[\uparrow\downarrow][\uparrow\downarrow][\uparrow\downarrow]}\ \underset{4s}{[]}\ \underset{3d}{[\uparrow\downarrow][\uparrow][\uparrow][\uparrow][\uparrow]}$, Diamagnetic
D. $\underset{1s}{[\uparrow\downarrow]}\ \underset{2s}{[\uparrow\downarrow]}\ \underset{2p}{[\uparrow\downarrow][\uparrow\downarrow][\uparrow\downarrow]}\ \underset{3s}{[\uparrow\downarrow]}\ \underset{3p}{[\uparrow\downarrow][\uparrow\downarrow][\uparrow\downarrow]}\ \underset{4s}{[]}\ \underset{3d}{[\uparrow\downarrow][\uparrow][\uparrow][\uparrow][\uparrow]}$, Paramagnetic

6. Which ion as the largest ionic radius?

A. Na^{+}
B. F^{-}
C. O^{2-}
D. Mg^{2+}

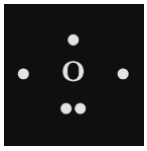
7. Which element has the highest first ionization energy?

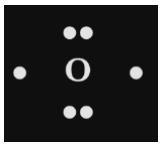
A. Na
B. Mg
C. Al
D. Si

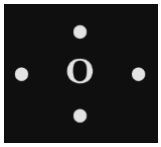
8. Which of the following elements has the greatest metallic character?

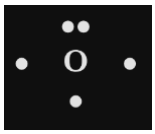
A. Ca
B. K
C. Al
D. Ne

9. What is the correct Lewis structure for oxygen?

A. 

B. 

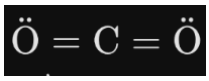
C. 

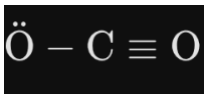
D. 

10. What is the correct Lewis structure for carbon dioxide?

A. 

B. 

C. 

D. 

11. Which is the correct order for the following ionic compounds in terms of increasing lattice energy?

A. CsI < NaCl < MgO
B. MgO < NaCl < CsI
C. NaCl < CsI < MgO
D. MgO < CsI < NaCl

12. Use the ionic bonding model to determine which compound has the higher melting point: CaO or KBr? Explain the relative ordering.

A. KBr has a higher melting point because its ions have smaller charges.
B. CaO has a higher melting point because its ions have larger charges.
C. KBr has a higher melting point because its ions have larger charges.
D. CaO has a higher melting point because its ions have smaller charges.

13. Arrange the following elements in order of decreasing electronegativity: Cl, Mg, S, Ca.

A. Cl > S > Mg > Ca
B. Ca > Mg > S > Cl
C. S > Cl > Ca > Mg
D. Mg > Ca > Cl > S

14. Classify the bond formed between potassium (K) and fluorine (F) given their electronegativities (K = 0.8, F = 4.0).

A. Pure covalent
B. Polar covalent
C. Ionic
D. Metallic

15. Write the correct Lewis structure for SO_4^{2-}

Answer Key

1. **A**
2. **C**
3. **B**
4. **A**
5. **D**
6. **C**
7. **D**
8. **B**
9. **B**
10. **C**
11. **A**
12. **B**
13. **A**
14. **C**