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Metals and Metallic Bonds (8.4)

80. How is a metallic bond different from an ionic bond?

Metallic bond: electrostatic attraction between a positive metal ion and free valence electrons; ionic bond: between a positive metallic ion and a negative nonmetallic ion

81. Briefly explain why silver is a good conductor of electricity.

It has delocalized electrons that are free to move.

82. Briefly explain why iron is used in making the structures of many buildings.

Iron forms a strong metallic bond, giving solid iron hardness and strength.

83. The melting point of beryllium is 1287°C, while that of lithium is 180°C. Account for the large difference in values.

Beryllium has two delocalized electrons per atom. Lithium has one. As the number of delocalized electrons increases, lattice energy increases raising the melting point.

84. Describe the difference between the metal alloy sterling silver and carbon steel in terms of the types of alloys involved.

Sterling silver is substitutional, formed from silver and copper. Carbon steel is interstitial, formed from iron and carbon.

Mixed Review

Sharpen your problem-solving skills by answering the following.

85. Give the number of valence electrons for atoms of oxygen, sulfur, arsenic, phosphorus, and bromine.

6, 6, 5, 5, and 7, respectively

86. Explain why calcium can form a Ca^{2+} ion but not a Ca^{3+} ion.

Ca ([Ar] $4s^2$) will lose 2 electrons. If it loses an inner 3p electron, it is unstable.

87. Which of the following ionic compounds would have the most negative lattice energy: NaCl, KCl, or $MgCl_2$? Explain your answer.

$MgCl_2$; lattice energy increases with increased charge.

88. Give the formula for each of the following ionic compounds.

a. sodium sulfide

Na_2S

b. iron(III) chloride

$FeCl_3$

c. sodium sulfate

Na_2SO_4

d. calcium phosphate

$Ca_3(PO_4)_2$

e. zinc nitrate

$Zn(NO_3)_2$

89. Cobalt, a transition metal, forms both the Co^{2+} and Co^{3+} ions. Write the correct formulas and give the name for the oxides formed by the two different ions.

CoO, cobalt(II) oxide; Co_2O_3, cobalt(III) oxide

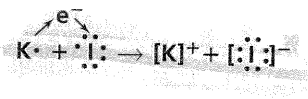
90. Briefly explain why gold can be used as both a conductor in electronic devices and in jewelry.

Delocalized electrons allow it to conduct. It is malleable and ductile.

91. Discuss the formation of the nickel ion with a 2+ oxidation number.

Nickel, $[Ar]3d^84s^2$, will lose the two outer 4s electrons.

92. Using electron-dot structure, diagram the formation of an ionic bond between potassium and iodine.



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