

Ionic Bonding Practice Problems

I. For each element, (1.) state the number of valence electrons in the atom, (2.) the electron dot formula, and (3.) chemical symbol for the most stable ion.

1. Barium (Ba)
 1. $2e^-$
 2. $Ba^{\cdot\cdot}$
 3. Ba^{+2}
2. Iodine (I)
 1. $7e^-$
 2. $\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{I}}{\overset{\cdot\cdot}{|}}$
 3. I^-
3. Potassium (K)
 1. $1e^-$
 2. K^{\cdot}
 3. K^+
4. Sulfur (S)
 1. $6e^-$
 2. $\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{S}}{\overset{\cdot\cdot}{|}}$
 3. S^{-2}

II. Use electron dot structures to predict the formula of the ionic compounds formed when the following elements combine.

1. Sodium and Bromine

$$\overset{\cdot\cdot}{Na} + \overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{Br}}{\overset{\cdot\cdot}{|}} \rightarrow [Na]^+ [\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{Br}}{\overset{\cdot\cdot}{|}}]^- (NaBr)$$
2. Sodium and Sulfur

$$\overset{\cdot\cdot}{Na} + \overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{S}}{\overset{\cdot\cdot}{|}} + \overset{\cdot\cdot}{Na} \rightarrow [Na]^+ [\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{S}}{\overset{\cdot\cdot}{|}}]^{2-} [Na]^+ (Na_2S)$$
3. Calcium and Iodine

$$\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{I}} + \overset{\cdot\cdot}{Ca} + \overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{I}} \rightarrow [\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{I}}]^- [Ca]^{+2} [\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{I}}]^- (CaI_2)$$
4. Magnesium and Oxygen

$$Mg^{\cdot\cdot} + \overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{O}}{\overset{\cdot\cdot}{|}} \rightarrow [Mg]^{+2} [\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{O}}{\overset{\cdot\cdot}{|}}]^{2-} (MgO)$$
5. Sodium and Fluorine

$$\overset{\cdot\cdot}{Na} + \overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{F}}{\overset{\cdot\cdot}{|}} \rightarrow [Na]^+ [\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{F}}{\overset{\cdot\cdot}{|}}]^- (NaF)$$
6. Lithium and Hydrogen

$$Li^{\cdot} + \overset{\cdot}{H} \rightarrow [Li]^+ [H]^- (LiH)$$
7. Magnesium and Chlorine

$$\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{Cl}} + \overset{\cdot\cdot}{Mg} + \overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{Cl}} \rightarrow [\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{Cl}}]^- [Mg]^{+2} [\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{Cl}}]^- (MgCl_2)$$
8. Aluminum and Oxygen

$$\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{O}} + \overset{\cdot\cdot}{Al} + \overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{O}} + \overset{\cdot\cdot}{Al} + \overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{O}} \rightarrow [\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{O}}]^{2-} [Al]^{+3} [\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{O}}]^{2-} [Al]^{+3} [\overset{\cdot\cdot}{\underset{\cdot\cdot}{|}}{\overset{\cdot\cdot}{O}}]^{2-}$$

(Al_2O_3)

III. Write the names of each of the following ionic compounds.

1. KOH potassium hydroxide
2. LiI lithium iodide
3. AlF₃ aluminum fluoride
4. FeCl₂ iron (II) chloride
5. MgO magnesium oxide
6. Co(NO₃)₂ cobalt (II) nitrate
7. MgSO₄ magnesium sulfate
8. NH₄Cl ammonium chloride
9. CrPO₄ chromium (III) phosphate
10. Ba(OH)₂ barium hydroxide
11. PbS lead (II) sulfide
12. Na₂CO₃ sodium carbonate
13. BaF₂ barium fluoride
14. Cu(NO₃)₂ copper (II) nitrate
15. AgI silver iodide
16. NiSO₄ nickel (II) sulfate
17. Zn₃(PO₄)₂ zinc phosphate
18. Na₃N sodium nitride
19. Cu₂CO₃ copper (I) carbonate
20. (NH₄)₂SO₄ ammonium sulfate

IV. Write formulas for the following ionic compounds.

1. Manganese II chloride $MnCl_2$
2. Iron III bromide $FeBr_3$
3. Potassium chlorate $KClO_3$
4. Ammonium dichromate $(NH_4)_2Cr_2O_7$
5. Lithium nitrate $LiNO_2$
6. Barium sulfate $BaSO_4$
7. Boron phosphide BP
8. Copper II phosphate $Cu_3(PO_4)_2$
9. Tin IV nitrate $Sn(NO_3)_4$
10. Beryllium oxide BeO
11. Nickel II chloride $NiCl_2$
12. Silver nitride Ag_3N
13. Silver nitrate $AgNO_3$
14. Manganese VII oxide Mn_2O_7

