

## Polyatomic Ion Worksheet

1. Write all the possible molecular formulas and names of the molecules formed when the following metals: Na, Ca and Al bond with the radicals:  $\text{CO}_3^{2-}$   $\text{ClO}_3^-$   $\text{PO}_4^{3-}$

Correct Molecular Formula	Name of molecule (use chart in notes)
$\text{Na}_1 \text{CO}_3_2 = \text{Na}_2\text{CO}_3$	Sodium carbonate
$\text{Na}_1 \text{ClO}_3_1 = \text{NaClO}_3$	" chlorate
$\text{Na}_1 \text{PO}_4_3 = \text{Na}_3\text{PO}_4$	" phosphate
$\text{Ca}_2 \text{CO}_3_2 = \text{CaCO}_3$	Calcium carbonate
$\text{Ca}_2 \text{ClO}_3_1 = \text{Ca}(\text{ClO}_3)_2$	" chlorate
$\text{Ca}_2 \text{PO}_4_3 = \text{Ca}_3(\text{PO}_4)_2$	" phosphate
$\text{Al}_3 \text{CO}_3_2 = \text{Al}_2(\text{CO}_3)_3$	aluminum carbonate
$\text{Al}_3 \text{ClO}_3_1 = \text{Al}(\text{ClO}_3)_3$	" chlorate
$\text{Al}_3 \text{PO}_4_3 = \text{AlPO}_4$	" phosphate

2. Some of the following molecules have not been properly bonded. Determine which are wrong and re-write them correctly.

Molecule	Correct molecular formula
NaOH ✓ (-1)	$\text{Na}_1 \text{OH}_1 = \text{NaOH}$ ✓
$\text{Li}_2\text{NO}_3$ ✗ (-1)	$\text{Li}_1 \text{NO}_3_1 = \text{LiNO}_3$ ✗
$\text{Ca}_3(\text{CrO}_4)_2$ ✗ (-2)	$\text{Ca}_2 \text{CrO}_4_2 = \text{CaCrO}_4$ ✗
$\text{BPO}_4$ ✓ (-3)	$\text{B}_3 \text{PO}_4_3 = \text{BPO}_4$ ✓
$\text{Be}(\text{PO}_4)$ ✗ (-3)	$\text{Be}_2 \text{PO}_4_3 = \text{Be}_3(\text{PO}_4)_2$ ✗
$\text{MgCO}_3$ ✓ (-2)	$\text{Mg}_2 \text{CO}_3_2 = \text{MgCO}_3$ ✓
$\text{Mg}(\text{ClO}_3)_2$ ✓ (-1)	$\text{Mg}_2 \text{ClO}_3_1 = \text{Mg}(\text{ClO}_3)_2$ ✓
$\text{H}_2\text{SO}_4$ ✓ (-2)	$\text{H}_1 \text{SO}_4_2 = \text{H}_2\text{SO}_4$ ✓

3. The formula aluminum oxalate is  $\text{Al}_2(\text{C}_2\text{O}_4)_3$ . In this formula, what is the charge of the radical oxalate,  $\text{C}_2\text{O}_4$ ?
- A) 1-       B) 2-      C) 3-      D) 6-
4. Given that the radical  $\text{AsO}_4$  has charge of  $3^-$ , determine with the help of the periodic table, the formula of the compound resulting from its combination with magnesium.
- A)  $\text{MgAsO}_4$        B)  $\text{Mg}_3(\text{AsO}_4)_2$       C)  $\text{Mg}_3\text{AsO}_4$       D)  $\text{Mg}(\text{AsO}_4)_3$
5. Among the following chemical formulas, which contains two radicals?
- A)  $\text{H}_2\text{SO}_4$        B)  $\text{NH}_4\text{OH}$       C)  $\text{NaNO}_3$       D)  $\text{CaCO}_3$
6. Among the following chemical formulas, which contains a radical with a -3 charge?
- A)  $(\text{NH}_4)\text{SO}_4$       B)  $\text{NaNO}_3$        C)  $\text{Ca}_3(\text{PO}_4)_2$       D)  $\text{MgCO}_3$
7. Each statement below indicates the electric charge on the polyatomic ion in a given compound. Which of the following statements is true?
- A) In the compound  $\text{Ca}(\text{NO}_3)_2$ , the electric charge on the  $\text{NO}_3$  ion is 2-
- B) In the compound  $\text{Al}_2(\text{CrO}_4)_3$ , the electric charge on the  $\text{CrO}_4$  ion is 2-
- C) In the compound  $\text{K}_2\text{SO}_4$ , the electric charge on the  $\text{SO}_4$  ion is 1-
- D) In the compound  $\text{NH}_4\text{Cl}$ , the electric charge on the  $\text{NH}_4$  ion is 1-
8. What is the molecular formula of the compound formed by combining the phosphate ion  $\text{PO}_4^{3-}$  with the magnesium ion?
- A)  $\text{MgPO}_4$       B)  $\text{Mg}_3\text{PO}_4$       C)  $\text{Mg}_2(\text{PO}_4)_3$        D)  $\text{Mg}_3(\text{PO}_4)_2$
9. The molecular formula for barium silicate is  $\text{BaSiO}_3$ . In this formula, what is the charge of the polyatomic ion silicate  $\text{SiO}_3$ ?
- A) 1+      B) 1-      C) 2+       D) 2-
10. Among the following chemical formulas, which contains a radical with a -3 charge?
- A)  $(\text{NH}_4)_2\text{SO}_4$        B)  $\text{Ca}_3(\text{PO}_4)_2$       C)  $\text{NaNO}_3$       D)  $\text{MgCO}_3$
11. Which of the following is the correct formula for the compound aluminum cation and anion  $\text{Cr}_2\text{O}_7^{2-}$ ?
- A)  $\text{AlCr}_2\text{O}_7$       B)  $\text{Al}_3(\text{Cr}_2\text{O}_7)_2$       C)  $\text{Al}_2\text{Cr}_2\text{O}_7$        D)  $\text{Al}_2(\text{Cr}_2\text{O}_7)_3$
12. The molecular formula for magnesium chromate is  $\text{MgCrO}_4$ . In this formula, what is the charge of the polyatomic ion chromate  $\text{CrO}_4$ ?
- A) 1+      B) 1-      C) 2+       D) 2-
13. Write the chemical formula for the compound formed between the anion  $\text{PO}_4^{3-}$  and each of the following cations.

A- sodium  $\text{Na}_3\text{PO}_4$

C- calcium  $\text{Ca}_3(\text{PO}_4)_2$

B- aluminum  $\text{AlPO}_4$