

Naming Ionic Compounds Worksheet

Rules: name the metal (cation) first, then the non-metal (anion) ending in -ide. Charges must add to zero. Multivalent metals need a Roman numeral: iron(III). Put brackets around a polyatomic ion used more than once: $\text{Ca}(\text{OH})_2$.

Common cations

Na^+ K^+ Li^+ Ag^+ NH_4^+ (ammonium)
 Mg^{2+} Ca^{2+} Zn^{2+} Al^{3+}

Multivalent metals

Fe^{2+} / Fe^{3+} Cu^+ / Cu^{2+}
 Pb^{2+} / Pb^{4+} Sn^{2+} / Sn^{4+}

Monatomic anions (-ide)

F^- fluoride Cl^- chloride
 Br^- bromide I^- iodide
 O^{2-} oxide S^{2-} sulfide
 N^{3-} nitride P^{3-} phosphide

Polyatomic anions

OH^- hydroxide NO_3^- nitrate
 NO_2^- nitrite HCO_3^- hydrogen carbonate
 SO_4^{2-} sulfate SO_3^{2-} sulfite
 CO_3^{2-} carbonate PO_4^{3-} phosphate

A Binary compounds: formula → name

6 marks

- | | | | |
|----------------------------|-------|--------------------------|-------|
| 1. NaCl | _____ | 2. MgBr_2 | _____ |
| 3. Al_2O_3 | _____ | 4. K_2S | _____ |
| 5. CaF_2 | _____ | 6. Li_3N | _____ |

B Binary compounds: name → formula

6 marks

- | | | | |
|----------------------|-------|-----------------------|-------|
| 7. calcium chloride | _____ | 8. sodium oxide | _____ |
| 9. aluminum sulfide | _____ | 10. magnesium nitride | _____ |
| 11. potassium iodide | _____ | 12. zinc oxide | _____ |

C Multivalent metals (Roman numerals)

8 marks

Formula → name

- | | | | |
|---------------------------|-------|--------------------|-------|
| 13. FeCl_3 | _____ | 14. CuO | _____ |
| 15. Cu_2O | _____ | 16. PbO_2 | _____ |
| 17. SnCl_2 | _____ | | |

Name → formula

- | | | | |
|----------------------|-------|------------------------|-------|
| 18. iron(II) sulfide | _____ | 19. copper(II) nitride | _____ |
| 20. lead(II) bromide | _____ | | |

D Polyatomic ions

10 marks

Formula → name

- | | | | |
|---|-------|-----------------------|-------|
| 21. NaOH | _____ | 22. CaCO ₃ | _____ |
| 23. (NH ₄) ₂ SO ₄ | _____ | 24. KNO ₃ | _____ |
| 25. Mg ₃ (PO ₄) ₂ | _____ | | |

Name → formula

- | | | | |
|-------------------------------|-------|-----------------------|-------|
| 26. aluminum hydroxide | _____ | 27. ammonium chloride | _____ |
| 28. sodium hydrogen carbonate | _____ | 29. calcium nitrate | _____ |
| 30. iron(III) sulfate | _____ | | |

E Spot the mistake

4 marks

Explain the error and write the correct answer.

31. A student writes the formula for magnesium chloride as MgCl.

32. A student names FeCl₂ as "iron chloride."

33. A student writes calcium hydroxide as CaOH₂.

34. A student names NaCl as "sodium chlorine."

F Challenge

3 marks

35. What is the charge on iron in Fe₂O₃? Show your work, then name the compound.

36. Why does calcium chloride not need a Roman numeral, but copper chloride does?

37. Write the formula and name for the compound formed by ammonium and phosphate ions.

Naming Ionic Compounds Worksheet

Name: _____

Date: _____ Score: ____ / 37

ANSWER KEY

Rules: name the metal (cation) first, then the non-metal (anion) ending in -ide. Charges must add to zero. Multivalent metals need a Roman numeral: iron(III). Put brackets around a polyatomic ion used more than once: $\text{Ca}(\text{OH})_2$.

Common cations

 Na^+ K^+ Li^+ Ag^+ NH_4^+ (ammonium)

 Mg^{2+} Ca^{2+} Zn^{2+} Al^{3+}

Multivalent metals

 Fe^{2+} / Fe^{3+} Cu^+ / Cu^{2+}
 Pb^{2+} / Pb^{4+} Sn^{2+} / Sn^{4+}

Monatomic anions (-ide)

 F^- fluoride Cl^- chloride

 Br^- bromide I^- iodide

 O^{2-} oxide S^{2-} sulfide

 N^{3-} nitride P^{3-} phosphide

Polyatomic anions

 OH^- hydroxide NO_3^- nitrate

 NO_2^- nitrite HCO_3^- hydrogen carbonate

 SO_4^{2-} sulfate SO_3^{2-} sulfite

 CO_3^{2-} carbonate PO_4^{3-} phosphate

A Binary compounds: formula → name

6 marks

- | | | | |
|----------------------------|------------------|--------------------------|-------------------|
| 1. NaCl | sodium chloride | 2. MgBr_2 | magnesium bromide |
| 3. Al_2O_3 | aluminum oxide | 4. K_2S | potassium sulfide |
| 5. CaF_2 | calcium fluoride | 6. Li_3N | lithium nitride |

B Binary compounds: name → formula

6 marks

- | | | | |
|----------------------|-------------------------|-----------------------|-------------------------|
| 7. calcium chloride | CaCl_2 | 8. sodium oxide | Na_2O |
| 9. aluminum sulfide | Al_2S_3 | 10. magnesium nitride | Mg_3N_2 |
| 11. potassium iodide | KI | 12. zinc oxide | ZnO |

C Multivalent metals (Roman numerals)

8 marks

Formula → name

- | | | | |
|---------------------------|--------------------|--------------------|------------------|
| 13. FeCl_3 | iron(III) chloride | 14. CuO | copper(II) oxide |
| 15. Cu_2O | copper(I) oxide | 16. PbO_2 | lead(IV) oxide |
| 17. SnCl_2 | tin(II) chloride | | |

Name → formula

- | | | | |
|----------------------|-----------------|------------------------|-------------------------|
| 18. iron(II) sulfide | FeS | 19. copper(II) nitride | Cu_3N_2 |
| 20. lead(II) bromide | PbBr_2 | | |

D Polyatomic ions

10 marks

Formula → name

- | | | | |
|---|---------------------|-----------------------|-------------------|
| 21. NaOH | sodium hydroxide | 22. CaCO ₃ | calcium carbonate |
| 23. (NH ₄) ₂ SO ₄ | ammonium sulfate | 24. KNO ₃ | potassium nitrate |
| 25. Mg ₃ (PO ₄) ₂ | magnesium phosphate | | |

Name → formula

- | | | | |
|-------------------------------|---|-----------------------|-----------------------------------|
| 26. aluminum hydroxide | Al(OH) ₃ | 27. ammonium chloride | NH ₄ Cl |
| 28. sodium hydrogen carbonate | NaHCO ₃ | 29. calcium nitrate | Ca(NO ₃) ₂ |
| 30. iron(III) sulfate | Fe ₂ (SO ₄) ₃ | | |

E Spot the mistake

4 marks

Explain the error and write the correct answer.

31. A student writes the formula for magnesium chloride as MgCl.
Charges don't balance: Mg²⁺ needs two Cl⁻. Correct: MgCl₂
32. A student names FeCl₂ as "iron chloride."
Iron is multivalent, so the charge must be shown. Correct: iron(II) chloride
33. A student writes calcium hydroxide as CaOH₂.
A polyatomic ion used more than once needs brackets. Correct: Ca(OH)₂
34. A student names NaCl as "sodium chlorine."
A monatomic anion ends in "-ide." Correct: sodium chloride

F Challenge

3 marks

35. What is the charge on iron in Fe₂O₃? Show your work, then name the compound.
3 O × (-2) = -6, so 2 Fe = +6 and each Fe is 3+. Name: iron(III) oxide
36. Why does calcium chloride not need a Roman numeral, but copper chloride does?
Calcium only forms Ca²⁺; copper can be Cu⁺ or Cu²⁺, so its charge must be stated.
37. Write the formula and name for the compound formed by ammonium and phosphate ions.
(NH₄)₃PO₄, ammonium phosphate