# Molecular, complete and net ionic equations worksheet

do not take apart the solid

Write the balanced molecular, complete ionic, and net ionic equations for each of the following reactions. Assume all reactions occur in aqueous solution. (Use the solubility rules when needed.)

1. $2\,NaCl(aq) + Pb(NO_3)_2(aq) \rightarrow PbCl_2(s) + 2\,NaNO_3(aq)$

leave together

$2Na^+_{(aq)} + 2Cl^-_{(aq)} + Pb^{+2}_{(aq)} + 2NO_{3(aq)} \rightarrow PbCl_{2(s)} + 2Na^+_{(aq)} + 2NO_{3(aq)}$

Net Ionic $2Cl^-_{(aq)} + Pb^{+2}_{(aq)} \rightarrow PbCl_{2(s)}$

2. $Na_2CO_3(aq) + FeCl_2(aq) \rightarrow FeCO_3(s) + 2NaCl(aq)$

$2Na^+_{(aq)} + CO_3^{2-}{}_{(aq)} + Fe^{+2}_{(aq)} + 2Cl^-_{(aq)} \rightarrow FeCO_{3(s)} + 2Na^+_{(aq)} + 2Cl^-_{(aq)}$

$CO_3^{2-}{}_{(aq)} + Fe^{2+}_{(aq)} \rightarrow FeCO_{3(s)}$

3. $Mg(OH)_2(aq) + HCl(aq) \rightarrow MgCl_2(aq) + H_2O(l)$

$Mg^{+2}_{(aq)} + 2OH^-_{(aq)} + 2H^+_{(aq)} + 2Cl^-_{(aq)} \rightarrow Mg^{+2}_{(aq)} + 2Cl^-_{(aq)} + 2H_2O_{(l)}$

$2H^+_{(aq)} + 2OH^-_{(aq)} \rightarrow 2H_2O_{(l)}$

4. $K_2(C_2O_4)(aq) + CaCl_2(aq) \rightarrow 2\,KCl(aq) + Ca(C_2O_4)(s)$

$2K^+_{(aq)} + C_2O_4^{2-}{}_{(aq)} + Ca^{2+}_{(aq)} + 2Cl^-_{(aq)} \rightarrow 2K^+_{(aq)} + 2Cl^-_{(aq)} + CaC_2O_{4(s)}$

$C_2O_4^{2-} + Ca^{2+} \rightarrow CaC_2O_4^{2-}$ ← oxalate ion, not on the test

5. $2\,(NH_4)_3PO_4(aq) + 3\,Zn(NO_3)_2(aq) \rightarrow 6\,NH_4NO_3(aq) + Zn_3(PO_4)_2(s)$

$6NH_4^+{}_{(aq)} + 2PO_4^{3-}{}_{(aq)} + 3Zn^{2+}_{(aq)} + 6NO_3^-{}_{(aq)} \rightarrow 6NH_4^+{}_{(aq)} + 6NO_3^-{}_{(aq)} + Zn_3(PO_4)_{2(s)}$

$3Zn^{2+}_{(aq)} + 2PO_4^{3-}{}_{(aq)} \rightarrow Zn_3(PO_4)_{2(s)}$

6. $3\,LiOH(aq) + VCl_3(aq) \rightarrow 3\,LiCl(aq) + V(OH)_3(s)$

$3Li^+_{(aq)} + 3OH^-_{(aq)} + V^{+3}_{(aq)} + 3Cl^-_{(aq)} \rightarrow 3Li^+_{(aq)} + 3Cl^-_{(aq)} + V(OH)_{3(s)}$

$3OH^-_{(aq)} + V^{3+}_{(aq)} \rightarrow V(OH)_{3(s)}$

7. $Na_2CO_3(aq) + HCl(aq) \rightarrow 2\,NaCl(aq) + CO_2(g) + H_2O(g)$

$2Na^+_{(aq)} + CO_3^{2-}{}_{(aq)} + 2H^+_{(aq)} + 2Cl^-_{(aq)} \rightarrow 2Na^+_{(aq)} + 2Cl^-_{(aq)} + H_2CO_{3(aq)}$

$H_2CO_{3(aq)} \rightarrow H_2O_{(l)} + CO_{2(g)}$

8. $Mg(NO_3)_2(aq) + Na_2CrO_4(aq) \rightarrow 2NaNO_3(aq) + MgCrO_4(s)$

$Mg^{2+}_{(aq)} + 2NO^-_{3(aq)} + 2Na^+_{(aq)} + CrO_4^{2-}{}_{(aq)} \rightarrow MgCrO_{4(s)} + 2Na^+_{(aq)} + 2NO^-_{3(aq)}$

$Mg^{2+}_{(aq)} + CrO_4^{2-}{}_{(aq)} \rightarrow MgCrO_{4(s)}$

9. $2FeCl_3(aq) + 3Mg(s) \rightarrow 3MgCl_2(aq) + 2Fe(s)$

$2Fe^{+3}_{(aq)} + 6Cl^-_{(aq)} + 3Mg_{(s)} \rightarrow 3Mg^{+2}_{(aq)} + 6Cl^-_{(aq)} + 2Fe_{(s)}$

$2Fe^{+3}_{(aq)} + 3Mg_{(s)} \rightarrow 3Mg^{+2}_{(aq)} + 2Fe_{(s)}$

10 $Zr(OH)_4(s) + 4HNO_3(aq) \rightarrow Zr(NO_3)_4(aq) + H_2O(l)$ ← molecular

omit

$H_2SO_3$ breaks apart

weak acid

11. $Na_2SO_3(s) + HCl(aq) \rightarrow NaCl(aq) + H_2O(l) + SO_2(g)$

omit

12. $BaBr_2(aq) + Na_2SO_4(aq) \rightarrow 2NaBr(aq) + BaSO_4(s)$

$Ba^{2+}_{(aq)} + 2Br^-_{(aq)} + 2Na^+_{(aq)} + SO_4^{2-}{}_{(aq)} \rightarrow 2Na^+_{(aq)} + 2Br^-_{(aq)} + BaSO_{4(s)}$

$Ba^{2+}_{(aq)} + SO_4^{2-}{}_{(aq)} \rightarrow BaSO_{4(s)}$

13. $2AgNO_3(aq) + MgI_2(aq) \rightarrow 2AgI_{(s)} + Mg(NO_3)_{2(aq)}$

$2Ag^+_{(aq)} + 2NO^-_{3(aq)} + Mg^{2+}_{(aq)} + 2I^-_{(aq)} \rightarrow 2AgI_{(s)} + Mg^{2+}_{(aq)} + 2NO^-_{3(aq)}$

$2Ag^+_{(aq)} + 2I^-_{(aq)} \rightarrow 2AgI_{(s)}$

~~14~~ $(NH_4)_2C_2O_4(aq) + Al(ClO_4)_3(aq) \rightarrow$

$-2$ $+3$

omit

Do this

15. $Ni(NO_3)_2(aq) + 2NaOH(aq) \rightarrow Ni(OH)_{2(s)} + 2NaNO_{3(aq)}$

$Ni^{2+}_{(aq)} + 2NO^-_{3(aq)} + 2Na^+_{(aq)} + 2OH^-_{(aq)} \rightarrow Ni(OH)_{2(s)} + 2Na^+_{(aq)} + 2NO^-_{3(aq)}$

$Ni^{2+}_{(aq)} + 2OH^-_{(aq)} \rightarrow Ni(OH)_{2(s)}$