Net Ionic Equations Worksheet

E.g. 1: Zinc reacts with hydrochloric acid. (A single replacement reaction)

Non-ionic: $Zn_{(s)} + 2\,HCl_{(aq)} \rightarrow ZnCl_{2\,(aq)} + H_{2\,(g)}$

Total ionic: $Zn_{(s)} + 2\,H^+_{(aq)} + 2\,Cl^-_{(aq)} \rightarrow Zn^{2+}_{(aq)} + 2\,Cl^-_{(aq)} + H_{2\,(g)}$

Net ionic: $Zn_{(s)} + 2\,H^+_{(aq)} \rightarrow Zn^{2+}_{(aq)} + H_{2\,(g)}$

E.g. 2: A barium chloride solution reacts with a potassium sulphate solution. (A double replacement/precipitation reaction)

Non-ionic: $BaCl_{2\,(aq)} + K_2SO_{4\,(aq)} \rightarrow BaSO_{4\,(s)} + 2\,KCl_{(aq)}$

Total ionic: $Ba^{2+}_{(aq)} + 2\,Cl^-_{(aq)} + 2\,K^+_{(aq)} + SO_4^{2-}{}_{(aq)} \rightarrow BaSO_{4\,(s)} + 2\,K^+_{(aq)} + 2\,Cl^-_{(aq)}$

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

E.g. 3: Nitric acid neutralizes a sodium hydroxide solution. (A neutralization reaction):

Non-ionic: $HNO_{3\,(aq)} + NaOH_{(aq)} \rightarrow NaNO_{3\,(aq)} + H_2O_{(l)}$

Total ionic: $H^+_{(aq)} + NO_3^-{}_{(aq)} + Na^+_{(aq)} + OH^-_{(aq)} \rightarrow Na^+_{(aq)} + NO_3^-{}_{(aq)} + H_2O_{(l)}$

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

Exercise: Write the total ionic equation and the net ionic equation for each of the following reactions. All reactions are in aqueous solution.

1. Zinc reacts with a copper (II) sulphate solution.

2. Sodium reacts with water.

3. Chlorine water (aqueous Cl_2) reacts with a potassium iodide solution.

4. A lead (II) nitrate solution reacts with sodium sulphide solution to yield a precipitate.

5. Chloric acid is neutralized by a potassium hydroxide solution.

6. Hydrochloric acid is added to a solution of barium hydroxide.

7. Strontium metal reacts with water.

8. Aqueous solutions of lithium sulphate and barium chloride are mixed.

9. Potassium hydroxide solution added to a calcium bromide solution causes a precipitate to form.

10. Aqueous solutions of sodium phosphate and barium bromide are mixed.

11. An aqueous solution of washing soda, Na_2CO_3, is added to remove $Ca^{2+}_{(aq)}$ from water that contains dissolved calcium hydrogen carbonate.

12. Excess hydrochloric acid in gastric fluid may be neutralized by a magnesium hydroxide suspension.