**SCH 3U Chemical Reactions Worksheet**

For the following synthesis reactions, predict the products and balance the equations.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2Ca(s) | + | O2(g) | 🡪 | 2CaO(s) |
| Mg(s) | + | Cl2(g) | 🡪 | MgCl2(s) |
| CaO(s) | + | H2O(l) | 🡪 | Ca(OH)2(aq) |
| NH3(aq) | + | HI(aq) | 🡪 | NH4I(aq) |
| 2K(s) | + | Br2(l) | 🡪 | 2KBr(s) |
| 2Al(s) | + | 3S(s) | 🡪 | Al2S3(s) |
| SO2(g) | + | H2O(l) | 🡪 | H2SO3(aq) |

For the following decomposition reactions, predict the products and balance the equations.

|  |  |  |  |
| --- | --- | --- | --- |
| 2H2O(l) | 🡪 2H2(g) + O2(g)  |  |  |
| 2Al2O3(s) | 🡪 4Al(s) + 3O2(g) |  |  |
| 2Fe2O3(s) | 🡪 4Fe(s) + 3O2(g) |  |  |
| 2H2O2(aq) | 🡪 2H2O(l) + O2(g) |  |  |
| C11H22O11(s) | 🡪 11C(s) + 11H2O(l) |  |  |
| H2CO3(s) | 🡪 H2O(l) + CO2(g) |  |  |
| KClO3(s) | 🡪 KCl(s) + O2(g) |  |  |

For the following single displacement reactions, predict whether a reaction will occur. Balance the equations for reactions that proceed, indicate “no reaction” for those that do not.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Zn(s) | + | Cu(NO3)2(aq) | 🡪 | Cu(s) + Zn(NO3)2(aq) |  |
| Cu(s) | + | 2AgNO3(aq) | 🡪 | 2Ag(s) + Cu(NO3)2(aq) |  |
| 2Al(s) | + | 3H2SO4(aq) | 🡪 | 3H2(g) + Al2(SO4)3(aq) |  |
| Mg(s) | + | Zn(OH)2(aq) | 🡪 | Zn(s) + Mg(OH)2(aq) |  |
| Ag(s) | + | PbCl2(aq) | 🡪 | No Reaction |  |
| 2Fe(s) | + | 3CuSO4(aq) | 🡪 | 3Cu(s) + Fe2(SO4)3(aq) |  |
| Ca(s) | + | MgS(aq) | 🡪 | Mg(s) + CaS(aq) |  |
| Cl2(g) | + | 2NaBr(aq) | 🡪 | Br2(l) + 2NaCl(aq) |  |
| Br2(l) | + | NaCl(aq) | 🡪 | No Reaction |  |
| F2(g) | + | CaCl2(aq) | 🡪 | Cl2(g) + CaF2(aq) |  |
| I2(s) | + | KI(aq) | 🡪 | No Reaction |  |
| 2Na(s) | + | 2H2O(l) | 🡪 | H2(g) + 2NaOH(aq) |  |
| Pb(s) | + | SnI4(aq) | 🡪 | No Reaction |  |
| Hg(l) | + | Fe2(SO4)3(aq) | 🡪 | No Reaction |  |
| Ni(s) | + | 2AgNO3(aq) | 🡪 | Ni(NO3)2(aq) + 2Ag(s) |  |

State the 3 indications of a double displacement reaction

1. Precipitate

2. Gas

3. Neutralization

For the following double displacement reactions, predict whether or not a reaction will occur. Balance the equations for reactions that proceed, indicate “no reaction” for those that do not.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| KCl(aq) | + | Na2CO3(aq) | 🡪 | No Reaction |
| MgBr2(aq) | + | Ag2SO4(aq) | 🡪 | 2AgBr(s) + MgSO4(aq) |
| 3H2SO4(aq) | + | Ca3(PO4)2(aq) | 🡪 | 2H3PO4(aq) + 3CaSO4(s) |
| 2HCl(aq) | + | Mg(OH)2(aq) | 🡪 | MgCl2(aq) + 2H2O(l) |
| 2HNO3(aq) | + | Na2CO3(aq) | 🡪 | 2NaNO3(aq) + H2O(l) + CO2(g) |
| Na2SO4(aq) | + | BaCl2(aq) | 🡪 | BaSO4(s) + 2NaCl(aq) |
| LiOH(aq) | + | Na3P(aq) | 🡪 | No Reaction |
| 2HBr(aq) | + | Na2SO3(aq) | 🡪 | 2NaBr(aq) + H2O(l) + SO2(g) |
| CuSO4(aq) | + | 2NaOH(aq) | 🡪 | Cu(OH)2(s) + Na2SO4(aq) |
| Na2CO3(aq) | + | CaCl2(aq) | 🡪 | 2NaCl(aq) + CaCO3(s) |
| 2HCl(aq) | + | Na2S(aq) | 🡪 | H2S(g) + 2NaCl(aq) |
| HCl(aq) | + | LiHCO3(aq) | 🡪 | LiCl(aq) + H2O(l) + CO2(g) |
| HI(aq) | + | KOH(aq) | 🡪 | KI(aq) + H2O(l) |
| NaCl(aq) | + | KI(aq) | 🡪 | No Reaction |
| FeCl3(aq) | + | 3NH4OH(aq) | 🡪 | Fe(OH)3(s) + 3NH4Cl(aq) |

For the following word problems, identify the type of reaction and provide the balanced chemical equation. Be sure to include states.

Zinc reacts with hydrochloric acid to produce zinc chloride and hydrogen gas.

Single displacement: Zn(s) + 2HCl(aq) 🡪 ZnCl2(aq) + H2(g)

Magnesium oxide reacts with water to produce sodium hydroxide.

Synthesis: Na2O(s) + H2O(l) 🡪 2NaOH(aq)

Potassium metal reacts with bromic acid to produce potassium bromate and hydrogen gas.

Single displacement: 2K(s) + 2HBrO3(aq) 🡪 2KBrO3(aq) + H2(g)

Ammonia gas (nitrogen trihydride) burns in air to produce nitrogen dioxide gas and water.

Decomposition: 4NH3(g) + 7O2(g) 🡪 4NO2(g) + 6H2O(l)

Calcium sulphite is heated to produce calcium oxide and sulphur dioxide gas.

Decomposition: CaSO3(s) 🡪 CaO(s) + SO2(g)

Iron(II) chloride reacts with sodium phosphate to produce iron(II) phosphate and sodium chloride

Double displacement: FeCl3(aq) + Na3PO4(aq) 🡪 FePO4(s) + 3NaCl(aq)