Equation Worksheet 1

a. Write the formulas for all reactants and products in the following synthesis and decomposition reactions.

b. Write a **balanced equation** using coefficients and subscripts based on the substances indicated.

c. Include **oxidation numbers** for all elements.

1. sodium + chlorine 🡪 sodium chloride

2. water + carbon dioxide 🡪 hydrogen carbonate

3. magnesium + iodine 🡪 magnesium iodide

4. aluminum hydroxide 🡪 aluminum oxide + water

5. calcium chlorate 🡪 calcium chloride + oxygen

6. zinc carbonate 🡪 zinc oxide + carbon dioxide

7. potassium fluoride 🡪 potassium + fluorine

Worksheet 1 Answer Key

a. Write the formulas for all reactants and products in the following synthesis and decomposition reactions.

b. Write a **balanced equation** using coefficients and subscripts based on the substances indicated.

c. Include **oxidation numbers** for all elements.

1. sodium + chlorine 🡪 sodium chloride

**2 Na0 + Cl20 🡪 2 Na+1Cl-1**

2. water + carbon dioxide 🡪 hydrogen carbonate

**H2+1O-2+ C+4O2-2 🡪 H2+1C+4O3-2**

3. magnesium + iodine 🡪 magnesium iodide

**Mg0+ I20 🡪 Mg+2I2-1**

4. aluminum hydroxide 🡪 aluminum oxide + water

**2 Al+3(O-2H+1)3-1 🡪 Al2+3O3-2 + 3 H2+1O-2**

5. calcium chlorate 🡪 calcium chloride + oxygen

**Ca+2(Cl+5O3-2)2-1 🡪 Ca+2Cl2-1 + 3 O20(g)**

6. zinc carbonate 🡪 zinc oxide + carbon dioxide

**Zn+2(C+4O3-2)-2 🡪 Zn+2O-2 + CO2-2 (g)**

7. potassium fluoride 🡪 potassium + fluorine

**2 K+1F-1 🡪 2 K0 + F20 (g)**

Equation Worksheet 2

a. Finish the following **single replacement** reactions.

b. Write a **balanced equation** using coefficients and subscripts based on the substances indicated.

c. Include **oxidation numbers** for all elements.

1. Zn + HCl 🡪

2. Al + Cu(SO4)🡪

3. Na + Mg(NO3)2 🡪

4. K + Mg(NO3)2 🡪

5. Ag + Cu(NO3)2 🡪

6. Zn + Ag(NO3)🡪

7. Ba + NaCl🡪

8. Cl2 + NaBr🡪

9. I2 + KBr🡪

10. Al + HCl🡪

Worksheet 2 Answer Key

a. Finish the following **single replacement** reactions.

b. Write a **balanced equation** using coefficients and subscripts based on the substances indicated.

c. Include **oxidation numbers** for all elements.

**Use Reference Table N or an Activity Series Table**

1. **Zn0 + 2 H+1Cl-1 🡪 Zn+2Cl2-1 + H20 (g)**

2. **2 Al0 + 3 Cu+2(S+6O4-2)-2🡪 Al2+3(S+6O4)3-2 + 3 Cu0**

3. **2 Na0 + Mg+2(N+5O3-2)2-1🡪 2 Na+1(N+5O3-2)-1+ Mg0**

4. **2 K0 + Mg+2(N+5O3-2)2-1🡪 2 K+1(N+5O3-2)-1+ Mg0**

5. Ag0 + Cu+2(N+5O3-2)2-1🡪 **No Reaction (Cu is more active than Ag)**

6. **Zn0 + 2 Ag+1(N+5O3-2) -1🡪 Zn+2(N+5O3-2)2-1+ 2 Ag0**

7. **Ba0 + 2 Na+1Cl-1🡪 Ba+2Cl2-1+ 2 Na0**

8. **Cl20 + 2 Na+1Br-1🡪 2 Na+1Cl-1+ Br20**

9. I20 + K+1Br-1🡪 **No Reaction (Br is more active than I)**

10. **2 Al0 + 6 H+1Cl-1🡪 2 Al+3Cl3-1+ 3 H20 (g)**

Equation Worksheet 3

1. Write a balanced equation using coefficients and subscripts based on the substances indicated.

2. Indicate the type of chemical reaction in the left margin (S, D, SR, DR)

3. Include oxidation numbers for all elements.

1. Zinc + Hydrogen chloride 🡪 Zinc chloride + Hydrogen

SR

2. Aluminum + Copper (II) sulfate 🡪 Aluminum Sulfate + Copper

3. Calcium Chlorite 🡪 Calcium chloride + Oxygen

4. Potassium oxide + Carbon (IV) oxide 🡪 Potassium Carbonate

5. Chlorine + Sodium bromide 🡪 Sodium chloride + Bromine

6. Aluminum hydroxide 🡪 Aluminum oxide + di-hydrogen monoxide0

7. Potassium fluoride 🡪 Potassium + Fluorine

8. Potassium chloride + Oxygen 🡪 Potassium chlorate

9. Nickel + Bromine 🡪 Nickel (II) bromide

10. Copper + Silver Nitrate 🡪 Copper (II) Nitrate + Silver

11. Ammonium hydroxide 🡪 Ammonia + Water

12. Aluminum sulfate + Calcium hydroxide 🡪 Aluminum hydroxide + Calcium sulfate

13. Hydrogen chloride + Sodium hydroxide 🡪 Sodium chloride + Water

14. Mercuric oxide 🡪 Mercury + Oxygen

15. Magnesium + Nitrogen 🡪 Magnesium nitride

Worksheet 3 Answer Key

1. Zinc + Hydrogen chloride 🡪 Zinc chloride + Hydrogen

SR

**Zn0 2 H+1Cl-1 Zn+2Cl2-1H20 (g)**

2. Aluminum + Copper (II) sulfate 🡪 Aluminum Sulfate + Copper

SR

**2 Al0 3 Cu+2(S+6O4-2)-2 Al2+3(S+6O4-2)3-23 Cu0 (g)**

3. Calcium Chlorite 🡪 Calcium chloride + Oxygen

D

**Ca+2(Cl+3O2-2)2-1 Ca+2Cl2-1 2 O20 (g)**

4. Potassium oxide + Carbon (IV) oxide 🡪 Potassium Carbonate

Syn

**K2+1O-2 C+4O2-2 K2+1(C+4O3-2)-2**

5. Chlorine + Sodium bromide 🡪 Sodium chloride + Bromine

SR

**Cl20 2 Na+1Br-1 2 Na+1Cl-1Br20 (g)**

6. Aluminum hydroxide 🡪 Aluminum oxide + di-hydrogen monoxide

D

**2 Al+3(O-2H+1)3-1 Al2+3O3-2 3 H2+1O-2**

7. Potassium fluoride 🡪 Potassium + Fluorine

D

**2 K+1F-1 2 K0 (g) F20 (g)**

8. Potassium chloride + Oxygen 🡪 Potassium chlorate

Syn

**2 K+1Cl-1 3 O20 (g) 2 K+1(Cl+5O3-2)-1**

9. Nickel + Bromine 🡪 Nickel (II) bromide

Syn

**Ni0 Br20 (g) Ni+2Br2-1**

10. Copper + Silver Nitrate 🡪 Copper (II) Nitrate + Silver

SR

**2** **Cu0 2 Ag+1(N+5O3-2) -1 2 Cu+1(N+5O3-2)2-1 2 Ag0**

11. Ammonium hydroxide 🡪 Ammonia + Water

D

**(N-3H4+1)+1(O-2H+1)-1 N-3H3+1 H2+1O-2**

12. Aluminum sulfate + Calcium hydroxide 🡪 Aluminum hydroxide + Calcium sulfate

DR

**Al2+3(S+6O4-2)3-2 3 Ca+2(O-2H+1)2-1 2 Al+3(O-2H+1)3-1 (s) 3 Ca+2(S+6O4-2)-2**

13. Hydrogen chloride + Sodium hydroxide 🡪 Sodium chloride + Water

DR

**H+1Cl-1 Na+1(O-2H+1)-1 Na+1Cl-1 H2+1O-2**

14. Mercuric oxide 🡪 Mercury + Oxygen

**2 Hg+2O-2 2 Hg0 O20 (g)**

D

15. Magnesium + Nitrogen 🡪 Magnesium nitride

Syn

**3 Mg0 N20 (g) Mg3+2N2-3**Equation Worksheet 4

1. Balanced the following equations using coefficients, and indicate oxidation numbers.

2. Indicate the type of chemical reaction in the left margin (S, D, SR, DR, CB)

3. Name all elements and compounds indicated.

1. Li + Br2 🡪 LiBr

S

2. Al + Cl2 🡪 AlCl3

3. HgO 🡪 Hg + O2

4. KI + Cl2 🡪 I2 + KCl

5. Zn + HCl 🡪 H2 + ZnCl2

6. Al + HCl 🡪 H2 + AlCl3

7. Mg + Br2 🡪 MgBr2

8. Al2O3 🡪 Al + O2

9. K + H2O 🡪 KOH + H2

10. C2H6 + O2 🡪 CO2 + H2O

11. Ni(ClO3)3 🡪 NiCl3 + O2

12. Ca(NO3)2 + H3(PO4) 🡪 Ca3(PO4)2 + H(NO3)

13. Fe + H2O 🡪 Fe2O3 + H2

14. O2 🡪 O3

Worksheet 4 Answer Key

1. Balanced the following equations using coefficients, and indicate oxidation numbers.

2. Indicate the type of chemical reaction in the left margin (S, D, SR, DR, CB)

3. Name all elements and compounds indicated.

1. 2 Li**0** + Br2**0** 🡪 2 Li**+1**Br**-1**

Syn

Lithium Bromine Lithium Bromide

2. 2 Al**0** + 3 Cl2**0** 🡪 2 Al**+3**Cl3**-1**

Syn

Aluminum Chlorine Aluminum Chloride

3. 2 Hg**+2**O**-2** 🡪 2 Hg**0** + O2**0**

D

Mercuric Oxide Mercury Oxygen

4. 2 K**+1**I**-1** + Cl2**0** 🡪 I2**0**+ 2 K**+1**Cl**-1**

SR

Potassium Iodide Chlorine Iodine Potassium Chloride

5. Zn**0** + 2 H**+1**Cl**-1** 🡪 H2**0**+ Zn**+2**Cl2**-1**

SR

Zinc Hydrogen Chloride Hydrogen Zinc Chloride

6. 2 Al**0** + 6 H**+1**Cl**-1** 🡪 3 H2**0**+ 2 Al**+3**Cl3**-1**

SR

Aluminum Hydrogen Chloride Hydrogen Aluminum Chloride

7. Mg**0** + Br2**0** 🡪 Mg**+2**Br2**-1**

Syn

Magnesium Bromine Magnesium Bromide

8. 2Al2**+3**O3**-2** 🡪 4 Al**0** + 3 O2**0**

D

Aluminum Oxide Aluminum Oxygen

9. 2 K**0** + 2 H2**+1**O**-1** 🡪 2 K**+1(**O**-2**H**+1**) **-1** + H2**0**

SR

Potassium Hydrogen Oxide Potassium Hydroxide Hydrogen

10. 2 C2**-3**H6**+1** + 7 O2**0** 🡪 4 C**+4**O2**-2** + 6 H2**+1**O**-2**

CB

Ethane Oxygen Carbon dioxide water

11. 2 Ni**+3**(Cl**+5**O3**-2**)3**-1** 🡪 2 Ni**+3**Cl3**-1** + 9 O2**0**

D

Nickel Chlorate Nickel Chloride Oxygen

12. 3 Ca**+2**(N**+5**O3**-2**)2**-1** + 2 H3**+1**(P**+5**O4**-2**) **-3** 🡪 Ca3**+2**(P**+5**O4**-2**)2**-3** + 6 H**+1** (N**+5**O3**-2**) **-1**

DR

Calcium Nitrate Hydrogen Phosphate Calcium Phosphate Hydrogen Nitrate

13. 2 Fe**0** + 3 H2**+1**O**-2** 🡪 Fe2**+3**O3**-2** + 3 H2**0**

SR

Iron Water Iron III Oxide Hydrogen

14. 3 O2**0** 🡪 2 O3**0**

Oxygen Ozone

Syn