Exercises

1 (a)

$$CuCl_2 + H_2 \longrightarrow Cu + HCl$$

Balance Cl

2 Cl on the left 1 Cl on the right.

we need 2 Cl on the right.

$$CuCl_2 + H_2 \rightarrow Cu + 2HCl$$

* ~~To HC~~ You cannot write HCl_2

(c) $Al + H_2SO_4 \rightarrow Al_2(SO_4)_3 + H_2$

Balance S

1 S on the left 3 S on the right

we need (3) S on the left

$$Al + 3H_2SO_4 \rightarrow Al_2(SO_4)_3 + H_2$$

Balance H

6 H on the left 2 H on the right

we need 6 H on the right.

$$Al + 3H_2SO_4 \rightarrow Al_2(SO_4)_3 + 3H_2$$

Balance Al

1 Al on the left 2 Al on the right

we need 2 Al on the left.

$2Al + 3H_2SO_4 \longrightarrow Al_2(SO_4)_3 + 3H_2$

(e)

$KNO_3 \longrightarrow KNO_2 + O_2$

O_2 appears twice on the right, so ~~done~~ balance O at the end.

K, N are balanced already.

Here we will try various combinations to match the two sides.

Balance O.

3 O on the left 4 O on the right

It is easier to change a compound appears alone on one side (KNO_3)

So change $KNO_3 \rightarrow 2KNO_3$

$2KNO_3 \longrightarrow KNO_2 + O_2$

Balance K

Now 2 K on the left 1 K on the right

$2KNO_3 \rightarrow 2KNO_2 + O_2$ //

2 (a) $SO_2 + O_2 \rightarrow SO_3$

S is already bananced, we need to balance O.

It is easy to change the number of compound which appears alone on one side.

Here change $SO_3 \rightarrow 2SO_3$

$SO_2 + O_2 \longrightarrow 2SO_3$

Balance S again

1 S on the left 2 S on the right

$2SO_2 + O_2 \rightarrow 2SO_3$ //

(c) $C_4H_{10} + O_2 \rightarrow CO_2 + H_2O$

Balance C

4 C on the left 1 C on the right

so we need $4CO_2$ on the righe side

$C_4H_{10} + O_2 \rightarrow 4CO_2 + H_2O$

Balance H

10 H on the left 2 H on the right

$C_4H_{10} + O_2 \rightarrow 4CO_2 + 5H_2O$

Balance O_2

2 O on the left 5 O on the right

we need $\frac{5}{2} O_2$ to balance this equation

$C_4H_{10} + \frac{5}{2} O_2 \rightarrow 4CO_2 + 5H_2O$

However, we should not use fractions in the chemical reaction equation.

We can multiply 2 on the both sides

$2C_4H_{10} + 5O_2 \rightarrow 8CO_2 + 10H_2O$

Now, we do not have to write a fractional number.

5 (a) Nitrogens and Hydrogens exist as a diatomic molecule in nature, so we need to balance following equation

$N_2 + H_2 \rightarrow NH_3$

Balance N

$N_2 + H_2 \rightarrow 2NH_3$

Balance H

$N_2 + 3H_2 \rightarrow 2NH_3$ //

6(a) we need to balance following equation.

$$Ca + Cl \rightarrow CaCl_2$$

Balance Cl.

$$Ca^{2+} + 2Cl^- \rightarrow CaCl_2$$ //

* This is an ionic bonding.

Ca ion has +2 charge

Cl ion has −1 charge

In order to balance the charge,

1 Ca^{2+} ion combines with 2 Cl^- ions.