The relations between thermite reaction and magnesium

What is thermite reaction?

- Thermite reaction is oxidation-reduction reaction between aluminum and metal oxide.
- Aluminum has great reducibility and it reduce metal oxide in this reaction.
- We used iron (Ⅲ) oxide in this research.

<the reaction formula>

$$Fe_2O_3 + 2Al \rightarrow 2Fe + Al_2O_3$$

Purpose and Hypothesis

- We tried to bring out thermite reaction many time, but we couldn’t form pure iron.
- And we start to do this research to make why we didn’t succeed clear.
- We thought magnesium which made ignition easy caused to fail.

Advance experiments

The product of advance experiments were …

- Weak and
- White in places.

Picture 1

Experiment 1

- Preparation

- ✓ Iron (Ⅲ) oxide : 9.00 g
- ✓ Aluminum : 3.00 g
- ✓ Magnesium : 0.00 ~ 3.00 g
- ✓ Two magnesium ribbons : 75 mm
- ✓ Stand
- ✓ Muffle
- ✓ Filter paper
- ✓ Lighter

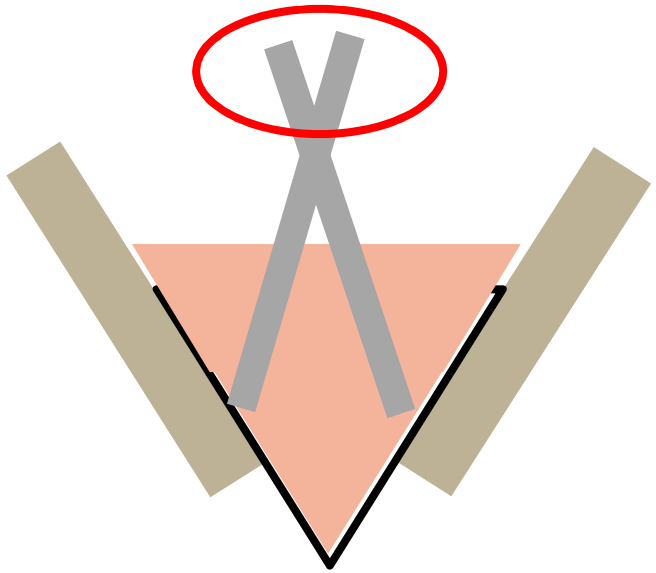
Experiment 1

- Process

① Compound aluminum with iron (Ⅲ) oxide and magnesium in mortar (mixture A)

② Set a stand, a muffle, filter paper, mixture A, magnesium ribbons and flower pot like picture 2

③ Ignite magnesium ribbons and bring out thermite reaction



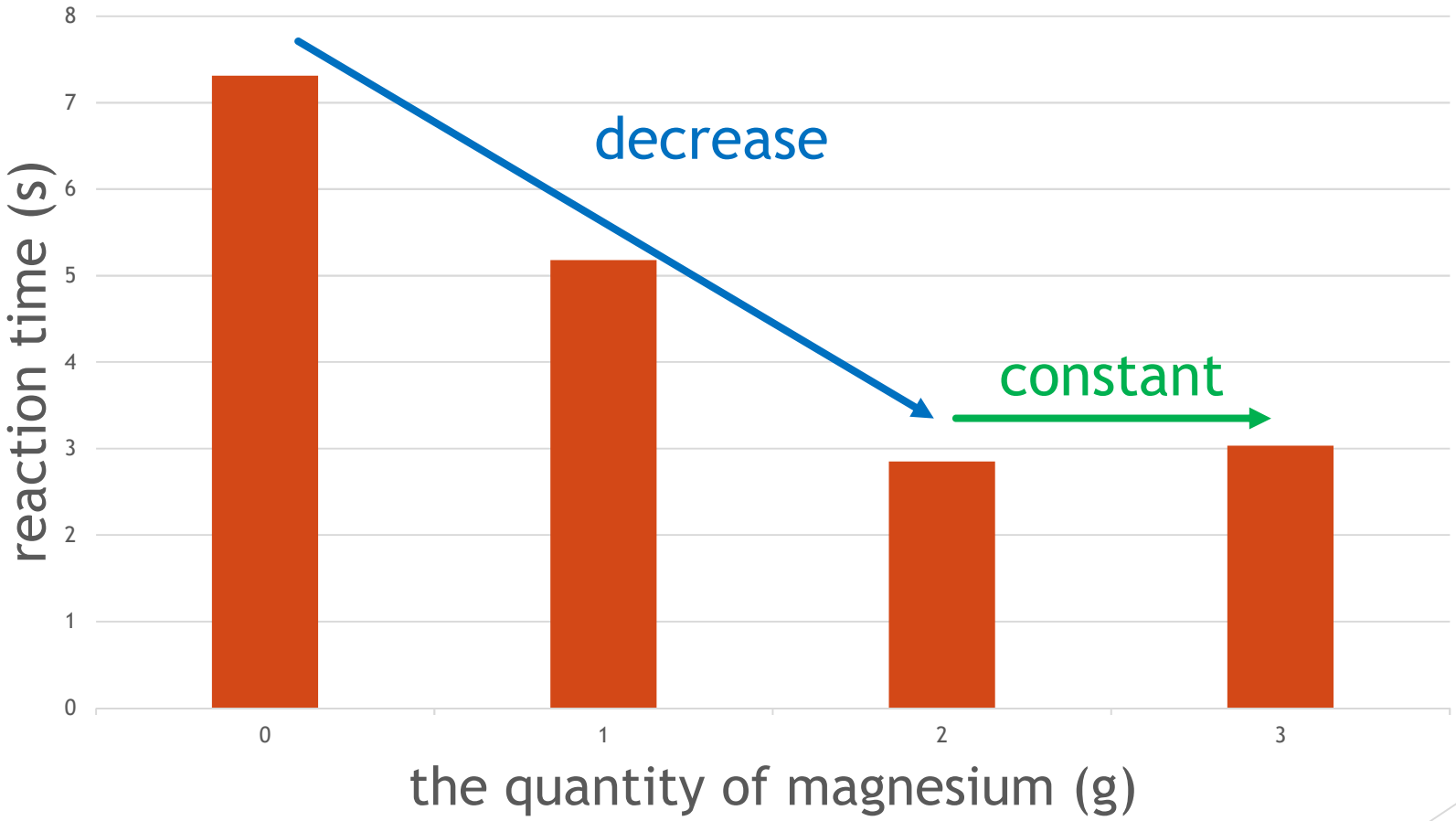
Picture 2

Result 1

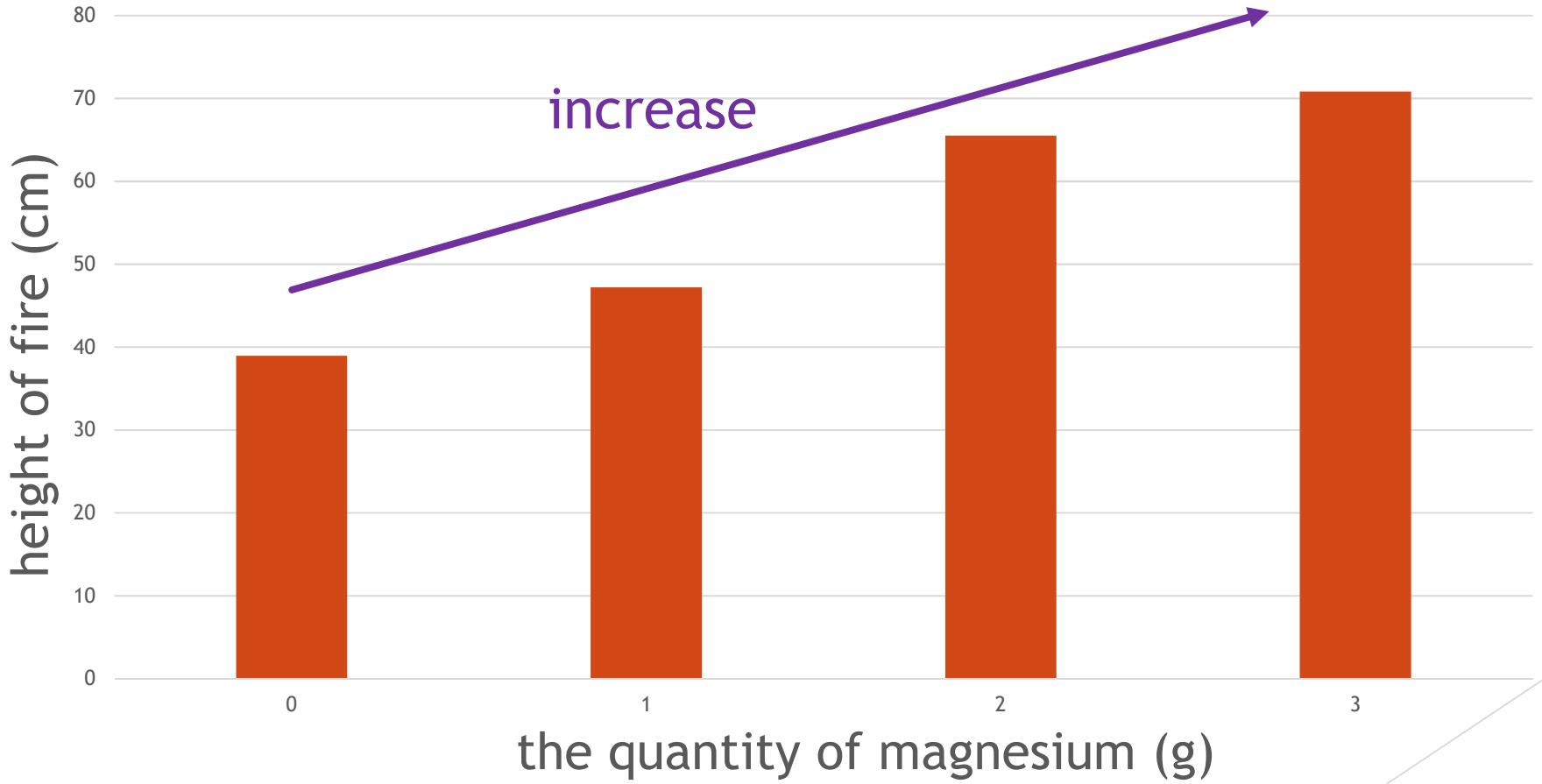
- Relations between…
- the quantity of magnesium and reaction time
- the quantity of magnesium and height of fire (intensity of reaction)

were seen in experiments.

Result 1
(the quantity of magnesium and reaction time)



Result 1
(the quantity of magnesium and height of fire)



Consideration

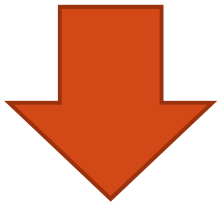
- The length of thermite reaction…

  (0 ~2 g) - decreases with increasing of magnesium.

  (2 g ~) – becomes contrast.
- Thermite reaction gets stronger with increasing of magnesium.
- The quantity of magnesium doesn’t decide whether thermite reaction succeed.

Hypothesis 2

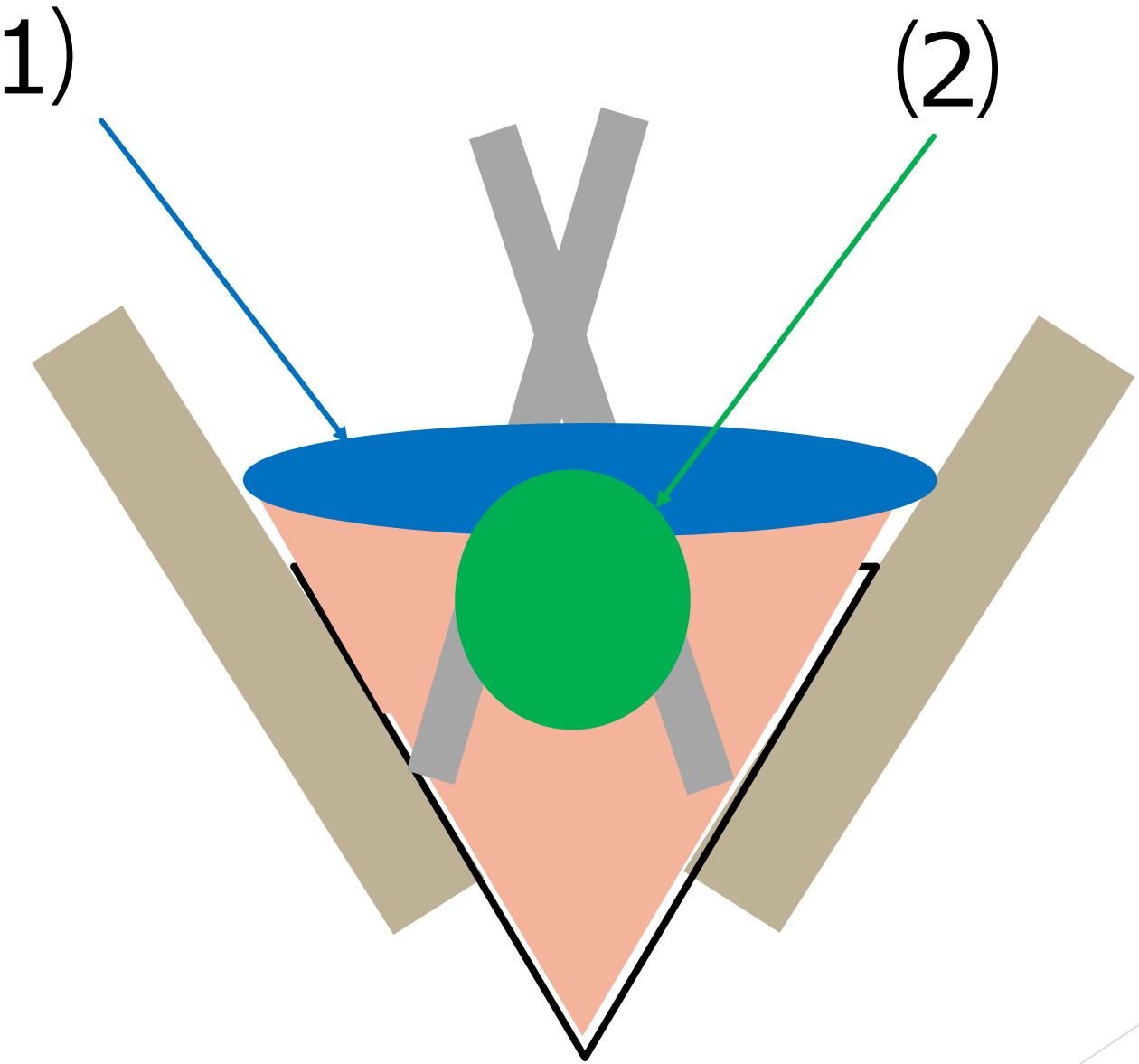
- “The quantity of magnesium doesn’t decide whether thermite reaction succeed.”



How about the place of magnesium?

Experiment 2

- Process : same as Experiment 1
- We didn’t mix magnesium powder with aluminum and iron (Ⅲ) oxide. (mixture B)
- (1) : we set magnesium powder on mixture B
- (2) : we made a hole in mixture B and set magnesium powder in it


(1)
(2)

Result 2

- In both cases, half of mixture didn’t react.
- **Magnesium oxide** on mixture B interferes thermite reaction, we thought.

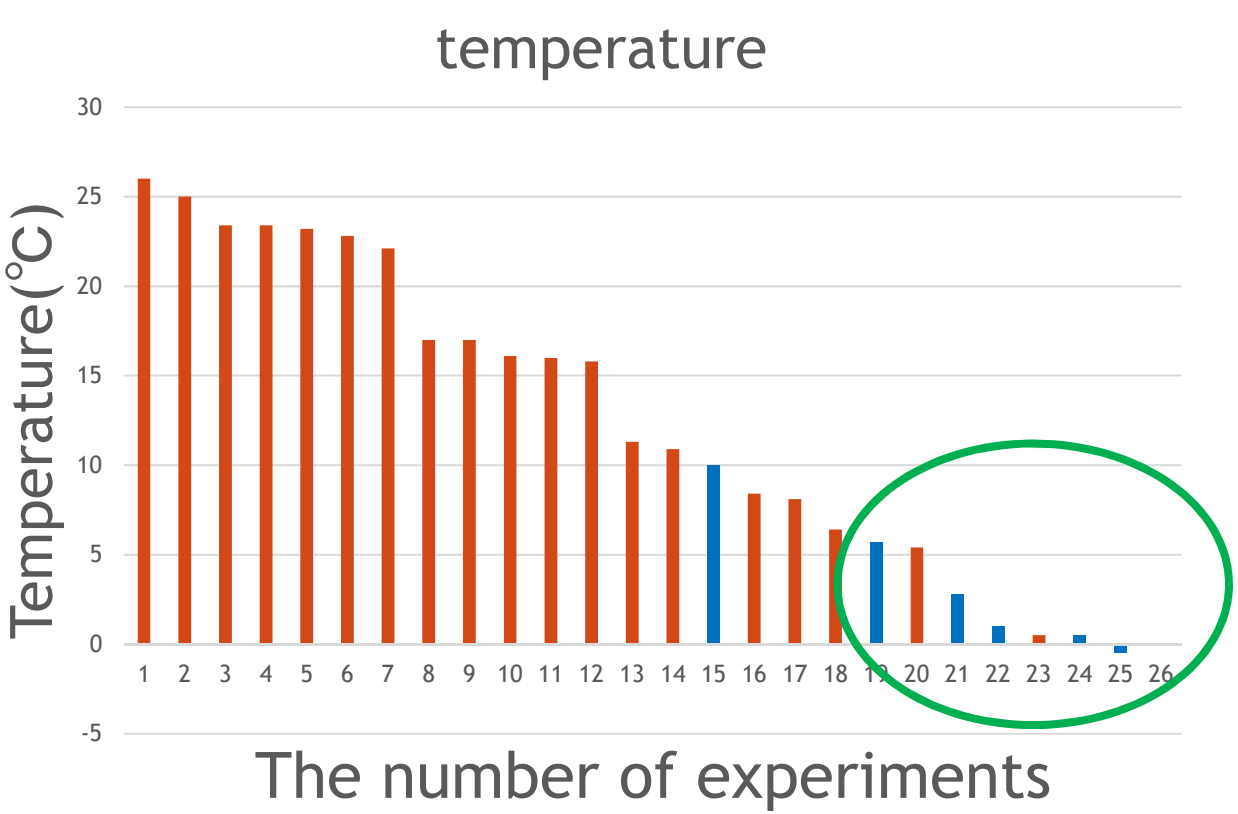
Other factors

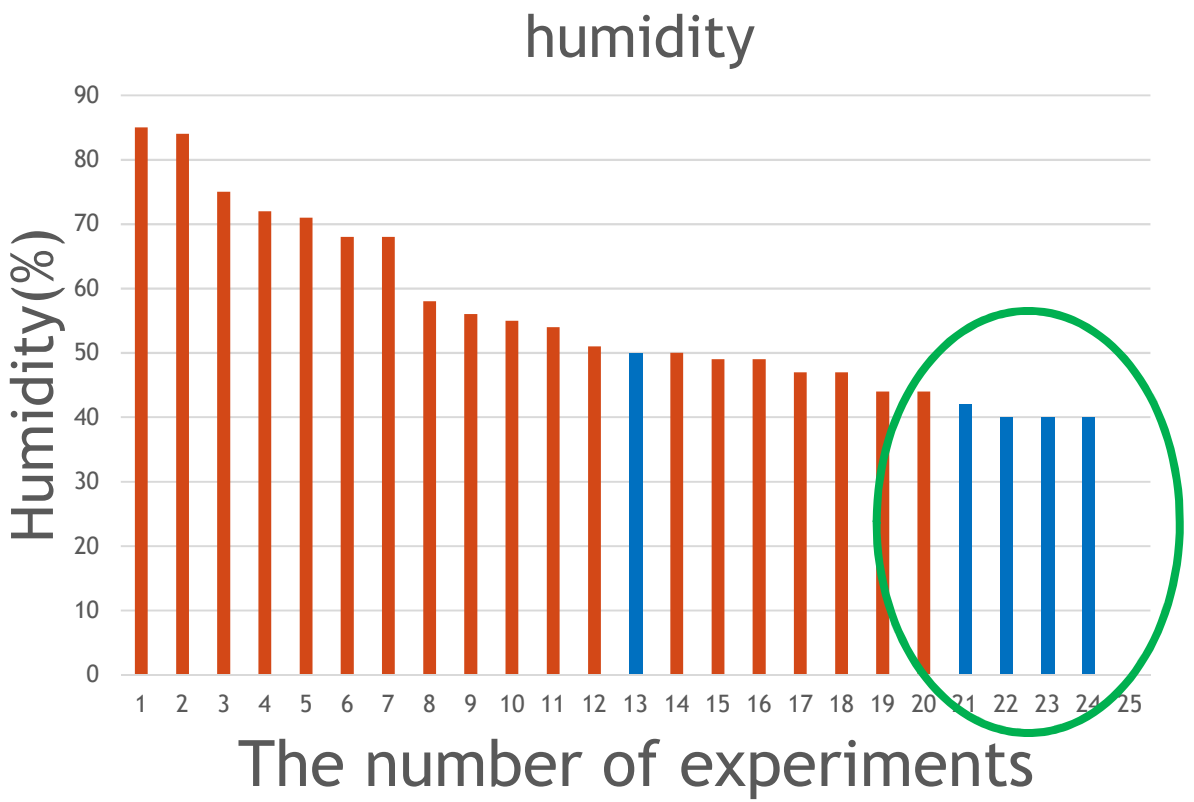
- Other factors such as…
- Temperature
- Humidity need investigating.

- Whether we succeed in thermite reaction may differ from season to season.

Other factors

Red - success
Blue - failure





Perspective

- The number of times of our experiments is short, so we are going to do it more time.

- In addition, we will consider how to use thermite reaction in our lives.

  (ex. welding of rails, recycling of metal…)

Thank you
for listening
to my presentation!!