

# Pocket body warmer

Level Elementary

## Concept

It is confirmed that heat is released in the chemical reaction by oxidization and sulphuration with iron powder.

## Experiment 1

### Iron and sulphur

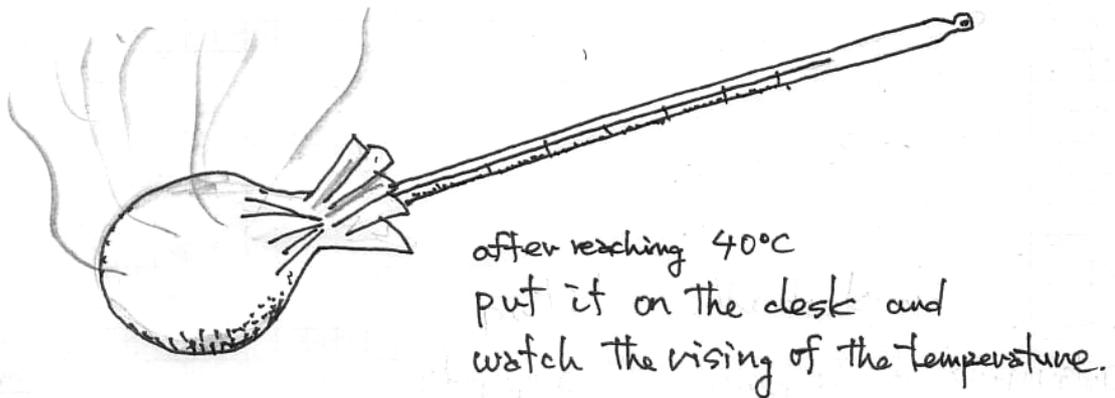
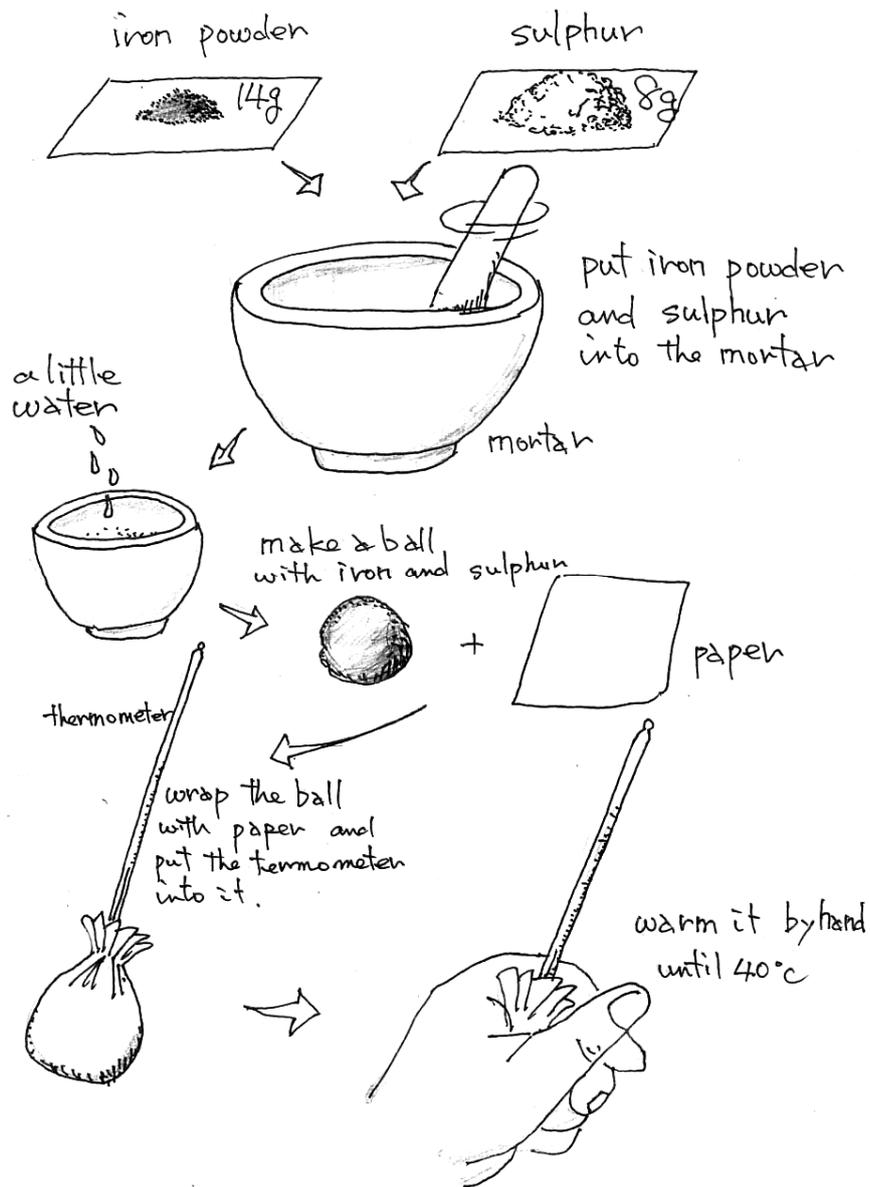
#### Materials

iron powder, sulphur, mortar, pestle, thermometer, paper, and balance

#### Procedure

- (1)The iron powder 14g and the sulphur 8g are measured and taken.  
Put them in the mortar and mix.
- (2)Water is put in by two and three drops, and the ball of iron filings and sulphur is made.
- (3)The ball is wrapped with the paper, and the thermometer is inserted in the inside.
- (4)The tucked ball with the paper is warmed by the palm.
- (5)Warm it by the palm until the temperature exceeds 40°C. You put on the desk afterwards, and observe it.





## Experiment 2

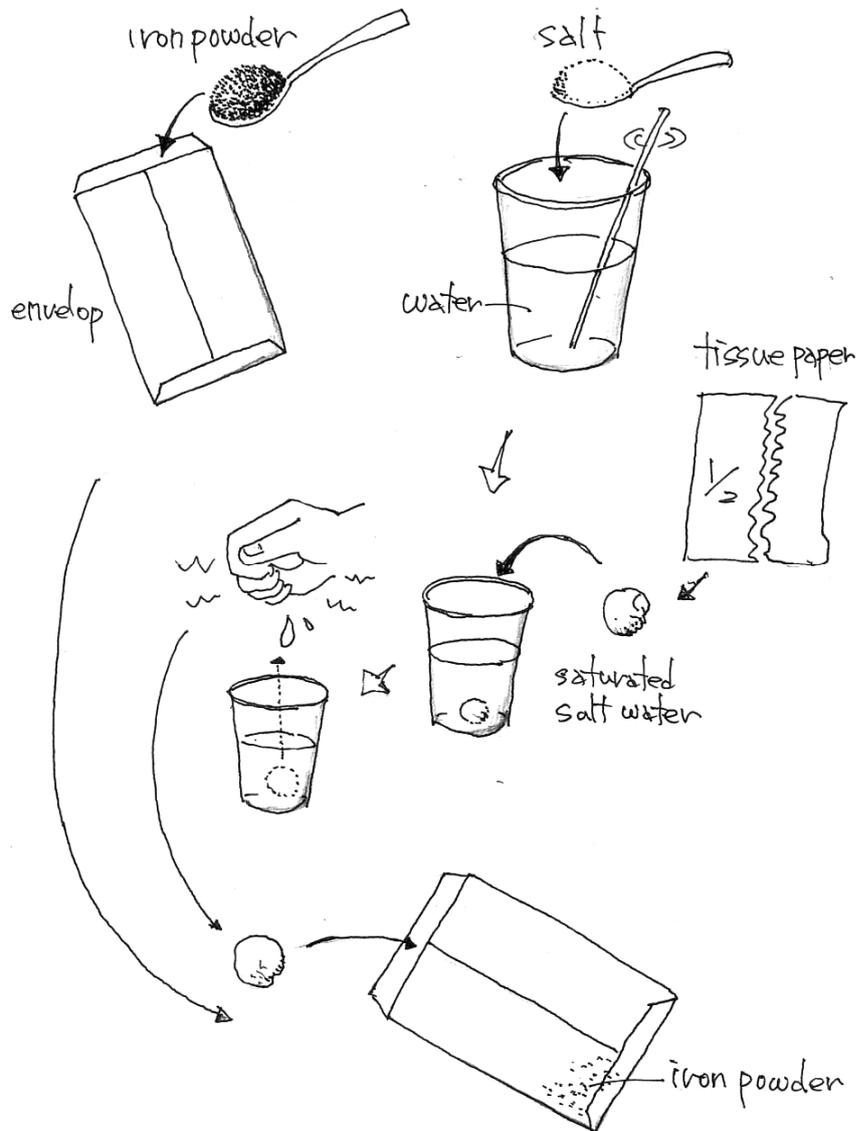
### Let's make the disposable body warmer (iron and oxygen)

#### Materials

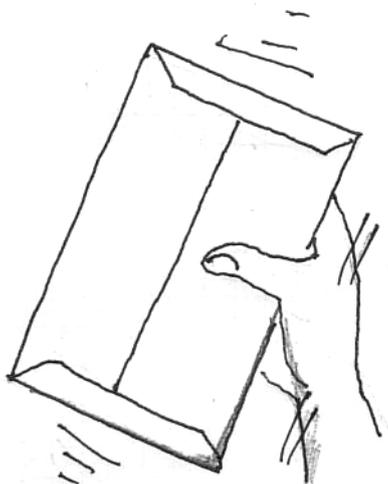
iron filing, salt, water, and the paper cup, and thin envelope, tissue paper, and activated carbon

#### Procedure

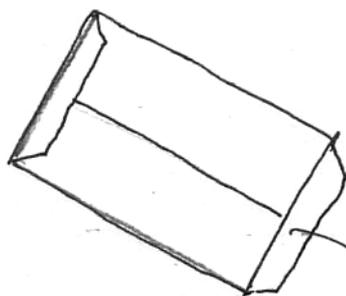
- (1) Iron filing is put in the thin envelope with a big spoon by about one heap. (Because it becomes difficult for air to enter the inside when paper is thick, it becomes difficult to rust.)
- (2) The salt solution (saturated solution) is made.  
Tear up tissue paper, and make it a ball. Soak it in the salt solution and then squeeze it well.  
Squeezed tissue paper is put in the envelope.



- (3) Seal and shake it often. You sometimes open the seal, and put some air in the inside.  
It gradually becomes warm, and the temperature goes up to about  $80^{\circ}\text{C}$ .
- (4) When the experiment ends, let's open an envelope and observe inside iron filings.  
Iron filings rusts and the color has reddened a little. (iron oxide)
- (5) The oxidation often advances when the activated carbon is put in the envelope together and the experiment goes well.



shaking



black color  
changed int red.