

# Oxygen and Hydrogen

Level Elementary

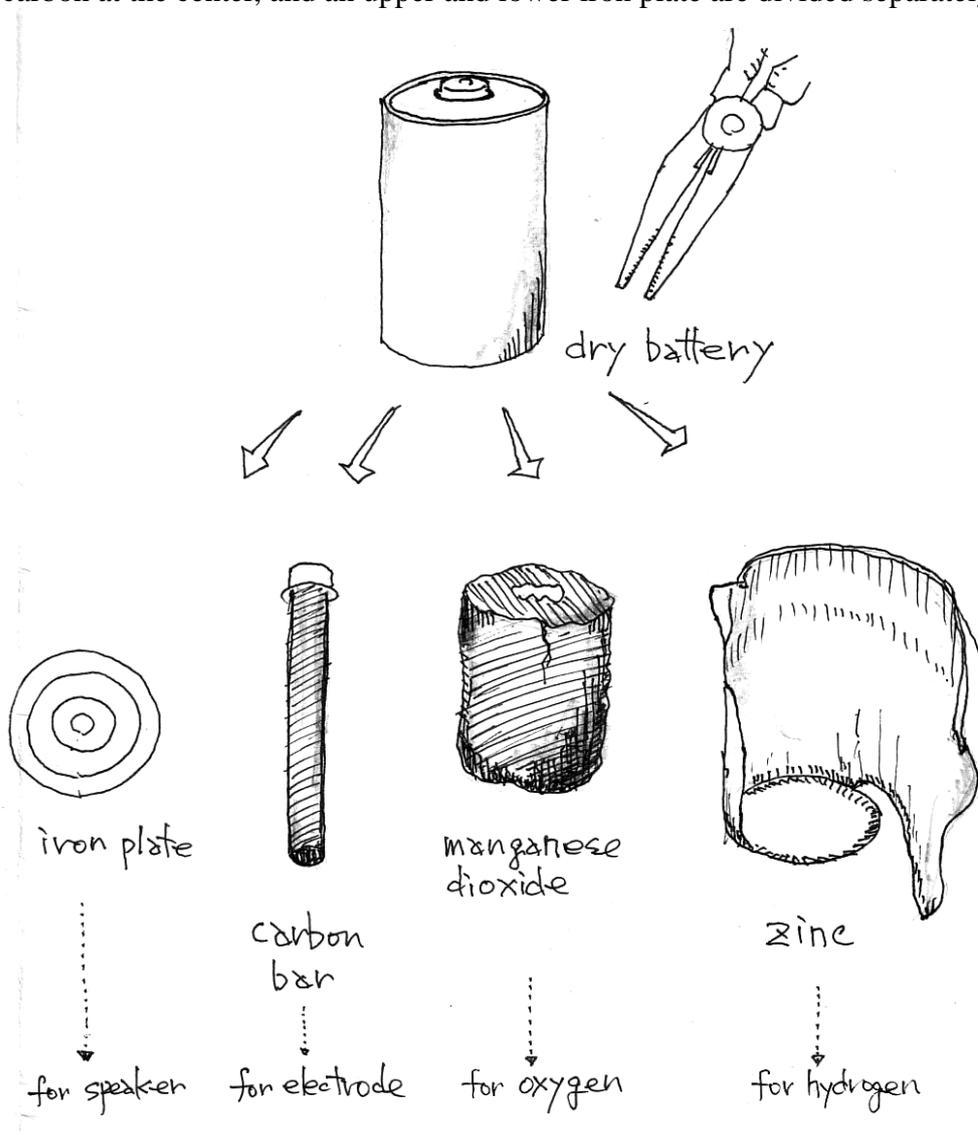
## Concept

Zinc and manganese dioxide can be taken out from the used dry battery. Oxygen and hydrogen are produced by using the acid, the hydrogen peroxide and the two materials of the dry battery. The property of oxygen and hydrogen is examined.

## Working

Taking out zinc and manganese dioxide from the dry battery

The dry battery is taken apart, and zinc on the surface and inside manganese dioxide, a carbon at the center, and an upper and lower iron plate are divided separately.



## Experiment 1

### Oxygen

#### Materials

dry battery (1.5V), dry battery (9V), hydrogen peroxide, water tank, PET bottle (2), straw, steel wool, spirit lamp, match, deflagrating spoon, radio pincers, nippers, and glass bottle



#### Procedure

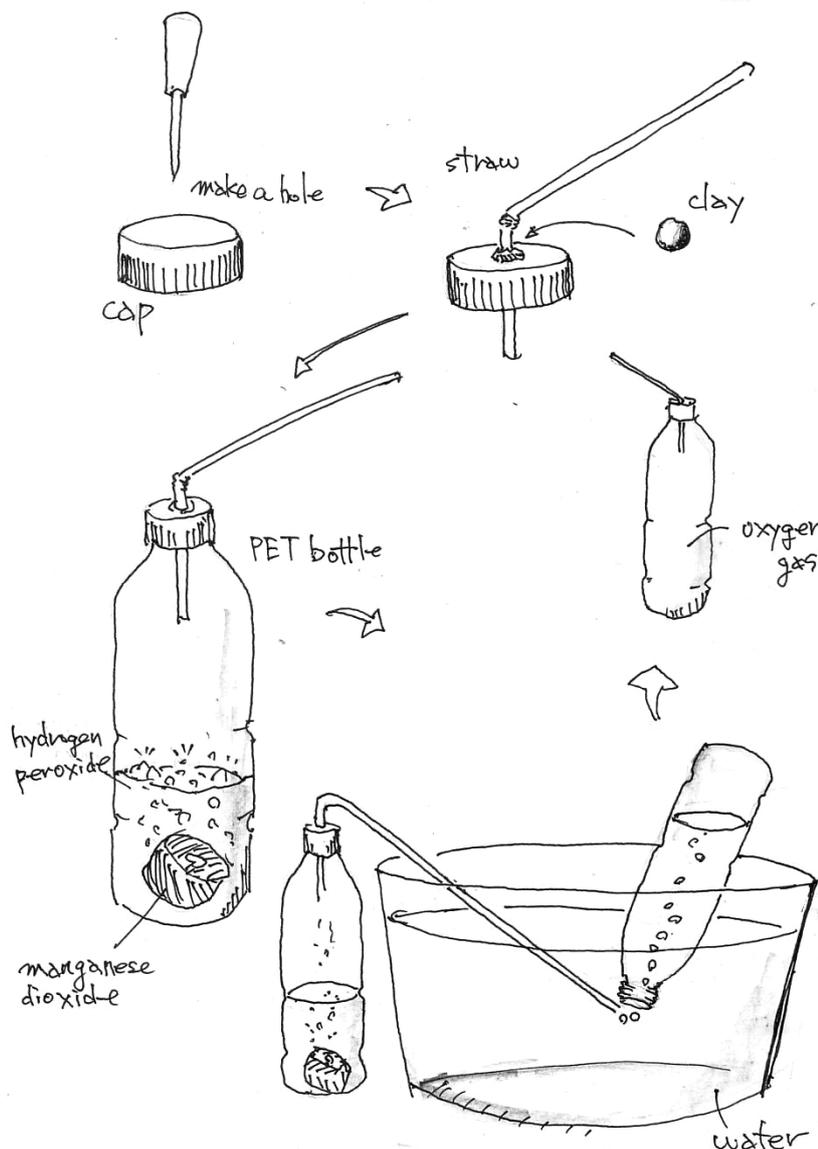
(1) The hole for the straw to the cap of the PET bottle is made.

Surroundings of the hole are closed with clay so that the gas should not leak here through the straw.

(2) The water substitution is prepared by putting water in the water tank, and using the PET bottle.

(3) The manganese dioxide and the hydrogen peroxide are put in the PET bottle, and the cap with the straw is done. The produced oxygen should be collected in the PET bottle quickly.

Because the reaction will end in a short time, it is points.



## Working

(1) Oxygen is quietly put in the bottle.

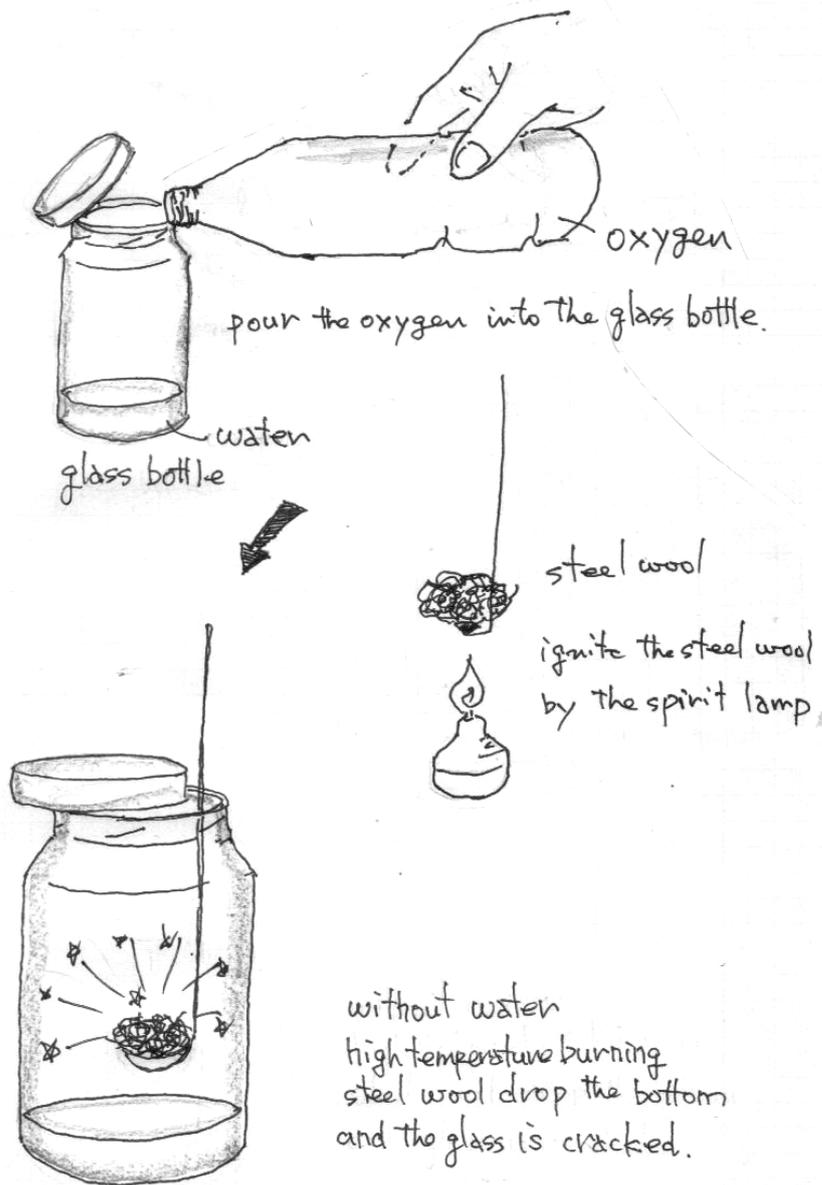
(2) The steel wool that sets fire by the spirit lamp is sent in.

It is possible that steel wool can ignite with a dry battery of 9V.

It is difficult to pour the oxygen into the bottle when ceiling fan is working.

You can put the ignited steel wool directly in the PET bottle which has full of oxygen. However, it is noted to change the PET bottle's shape easily because of heat.

The spit can be used when there is no deflagrating spoon.

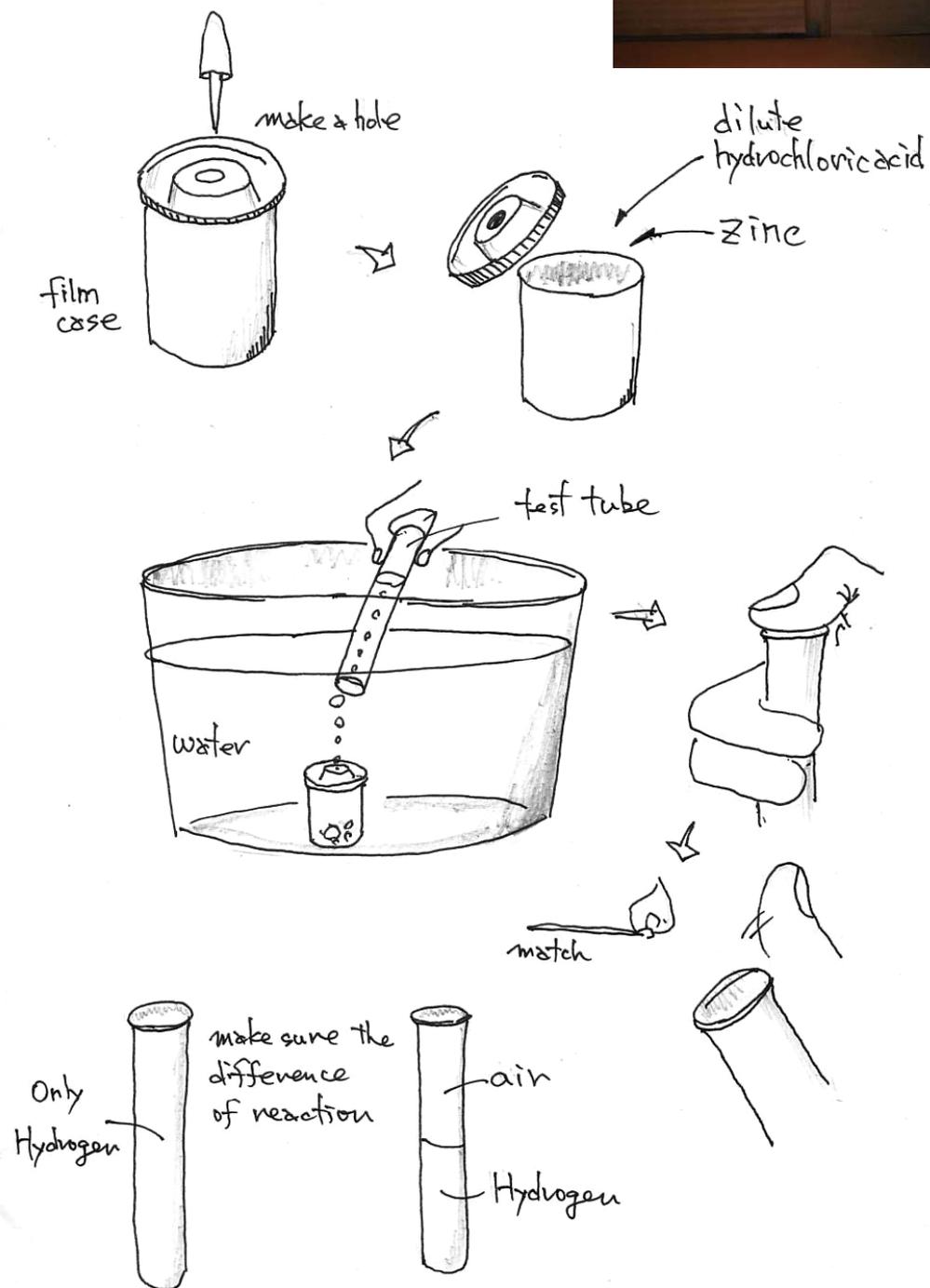


## Experiment 2

### Hydrogen

#### Materials

dry battery, dilute hydrochloric acid or dilute sulphuric acid, water tank, film case, test tube (2), match and nippers



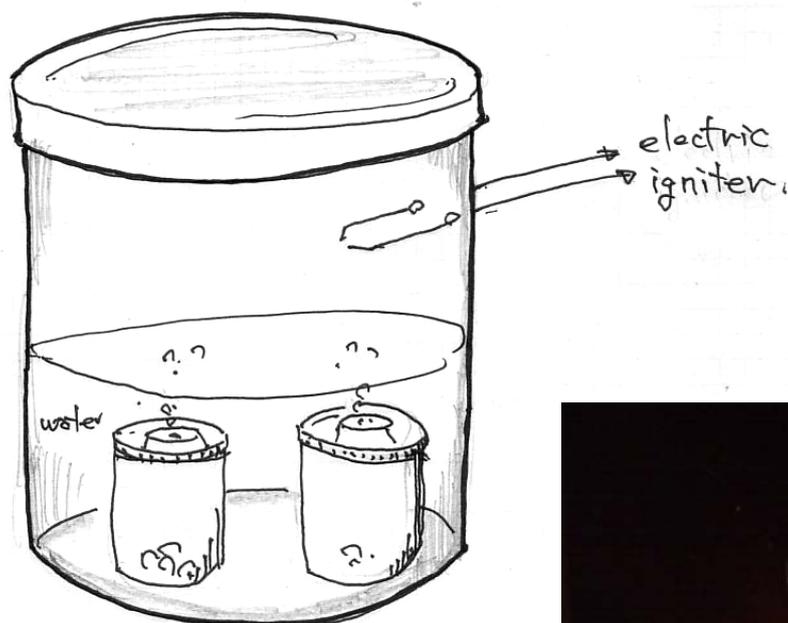
## Procedure

- (1) The hole is made for the cap of the film case.
- (2) The zinc plate is cut small by nippers.
- (3) The zinc plate and the dilute hydrochloric acid are put in the film case and cap it.  
If the vinegar is used for the replacement of the dilute hydrochloric acid or diluted sulphuric acid, the hydrogen is produced slowly.
- (3) The film case is put in the water tank.  
The produced hydrogen is collected in the test tube by the water substitution.
- (4) The mouth of the test tube is capped by using the thumb.
- (5) The match's fire is brought close to the mouth of the test tube, the thumb is opened, and the reaction is seen.
- (6) The reaction when half air is put in the test tube is examined, too.

## Question

Why the difference of two reactions happens is discussed about.

*If you want to make bigger pop sound ...*



## Experiment 3

### Hydrogen and oxygen

#### Materials

dry battery (1.5V), hydrogen peroxide, water tank, PET bottle (4), straw (4), dilute hydrochloric acid or diluted sulphuric acid, electric igniter and plastic bag with zipper

#### Procedure

- (1) Four PET bottles that make the cap the hole and pass the straw are prepared.
- (2) The manganese dioxide and the hydrogen peroxide are put in one PET bottle, and oxygen is collected in one PET bottle by the water substitution.
- (3) The zinc plate and the dilute hydrochloric acid are put in another PET bottle, hydrogen is collected in the PET bottle by the water substitution.
- (4) Oxygen and hydrogen are quietly put into the plastic bag with the zipper.
- (5) The igniter is inserted in the plastic bag.  
Ignite it.

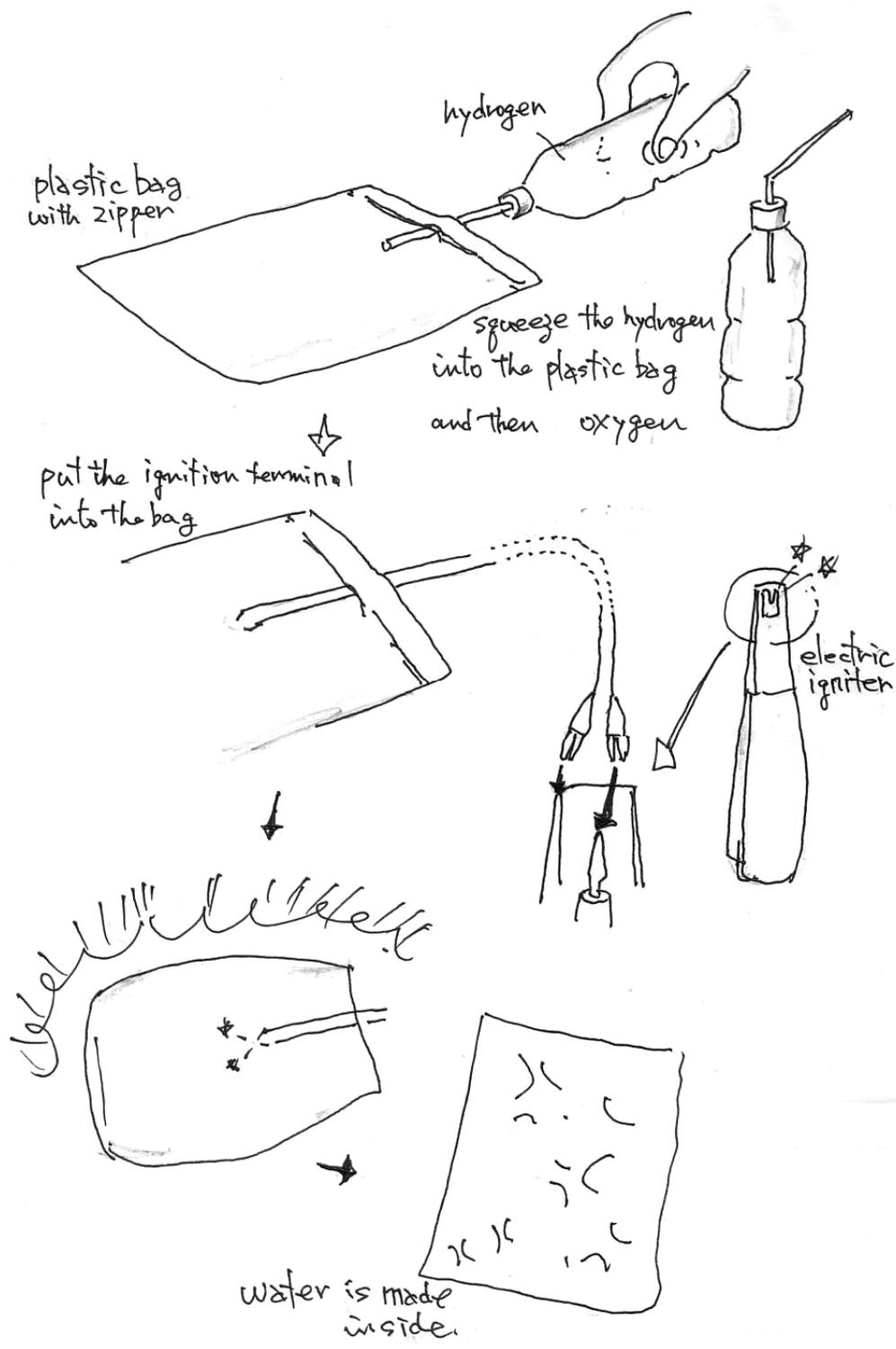
#### Science

It is confirmed that water is produced after it explodes in the plastic bag.

#### Question

If only hydrogen is into the plastic bag and is ignited, what will happen?





**Precaution**

Surroundings of the straw close with the zipper well so that the gas should not leak. The explosion becomes big if a lot of oxygen and hydrogen are put, and the bag breaks out. Because the produced water changed into steam, the gas putting in the bag should be a proper quantity.