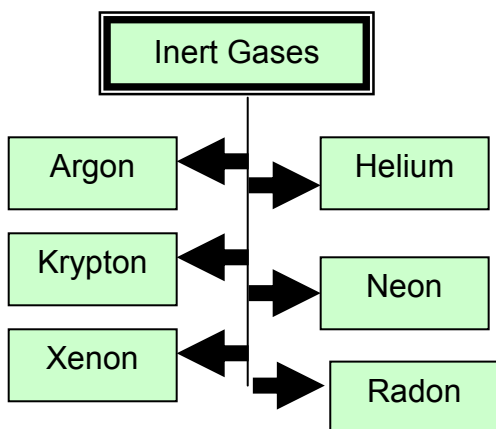
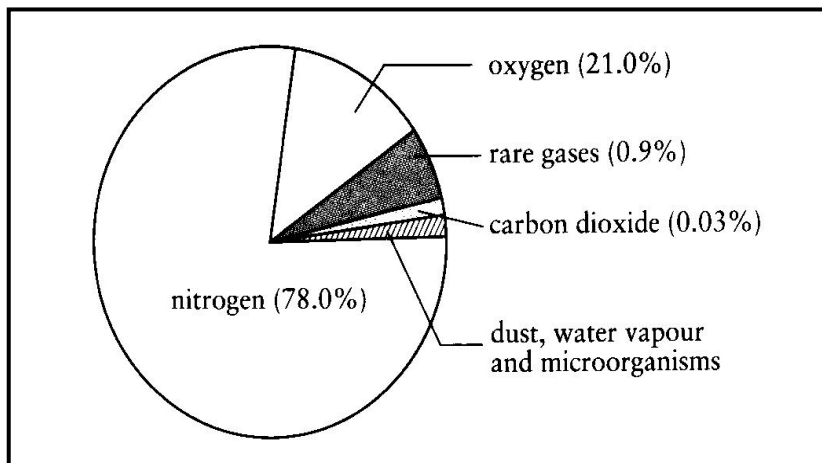


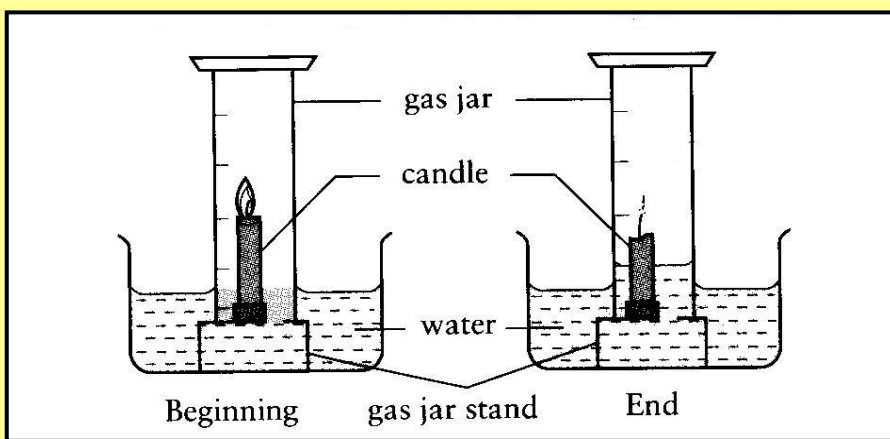
# CHAPTER 5 : THE AIR AROUND US

## The Composition of Air

- ☑ Air is a mixture consist of
  - **Nitrogen** 78%
  - **Oxygen** 21%
  - **Carbon dioxide** 0.03%
  - **Inert gases** 0.97%
  - **Water vapour**
  - **Microorganism**
  - **Dust**
- ☑ The percentage of the constituents of air are different from one place to another.



### To show the percentage of oxygen in the air



#### Observation :

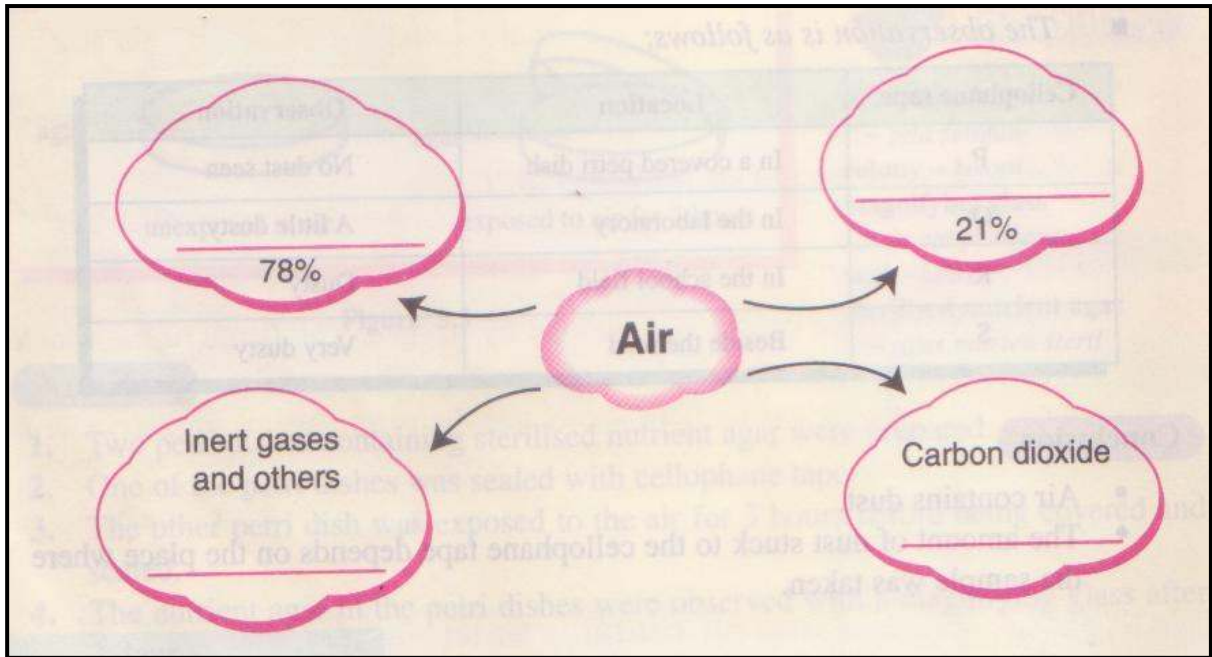
1. The burning candle goes out.
2. The water level in the gas jar rises **one – fifth** up the gas jar (20% of air in the air)

#### Conclusion :

The percentage of oxygen in the air is approximately 20%.

**Review 1**

1. Complete the chart below to show the composition of air and the percentage of each of its components.

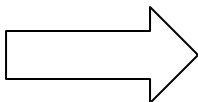


2. Tick ( ✓ ) the correct statements.

- (a) Air is a mixture of nitrogen, oxygen, carbon dioxide and inert gases.
- (b) The average percentage of oxygen in air is the same everywhere.
- (c) Air contains dust, microorganisms and water vapour.
- (d) The composition of air in a jungle is not the same as that in the city centre.
- (e) The air in a crowded hall has the same content of oxygen as the air in an empty hall.
- (f) Air is a mixture because its composition is not always the same.
- (g) The content of water vapour in the air changes at different times of the day.

**The Properties of Gas**

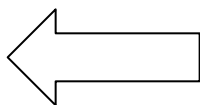
**OXYGEN**



- Colourless
- Odourless
- More soluble in water
- Very soluble in sodium hydroxide
- Turns damp blue litmus paper to red
- Turns lime water milky
- Extinguishes a burning splinter
- Changes the colour of hydrogen carbonate from red to yellow
- Does not support combustion
- Acidic

- Colourless
- Odourless
- Slightly soluble in water
- Not soluble in sodium hydroxide
- No effect on damp litmus paper
- No effect on lime water
- Relights a glowing splinter
- No effect on hydrogen carbonate solution
- Support combustion
- Neutral

**CARBON DIOXIDE**



**CONFIRMATORY TEST**

**OXYGEN**



Relights glowing splinter

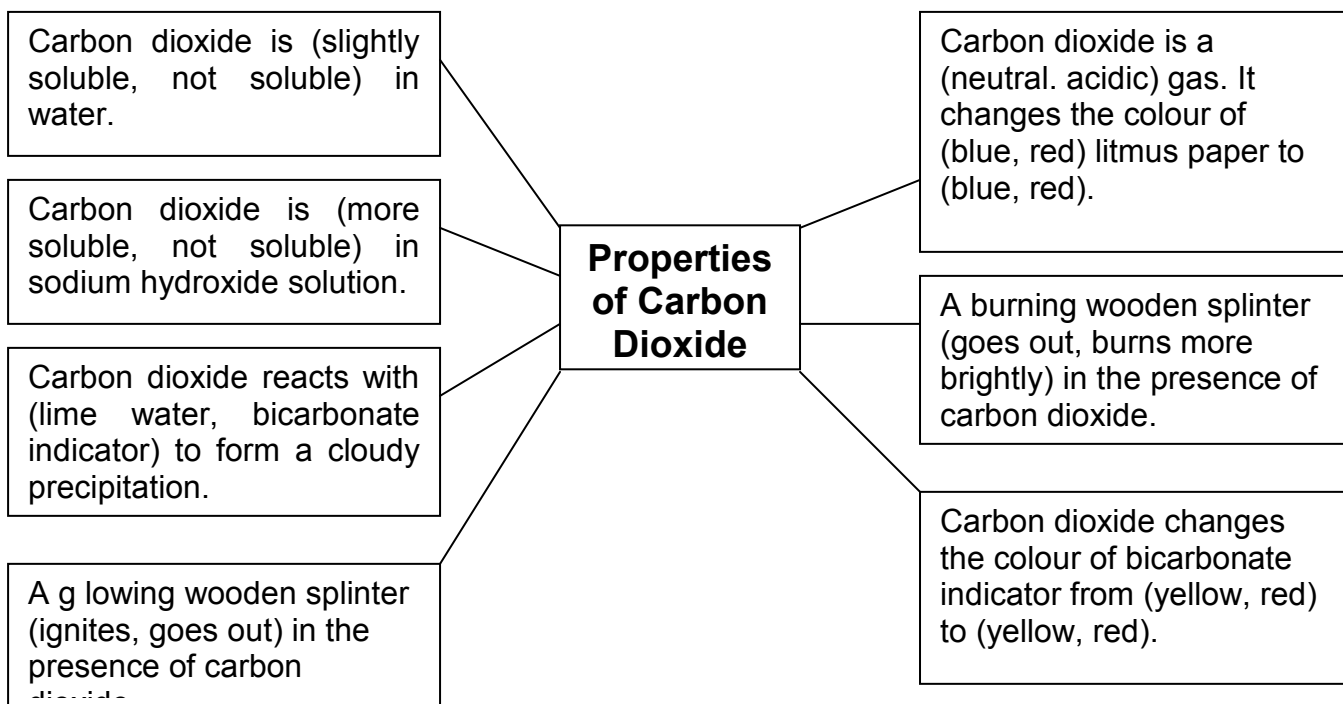
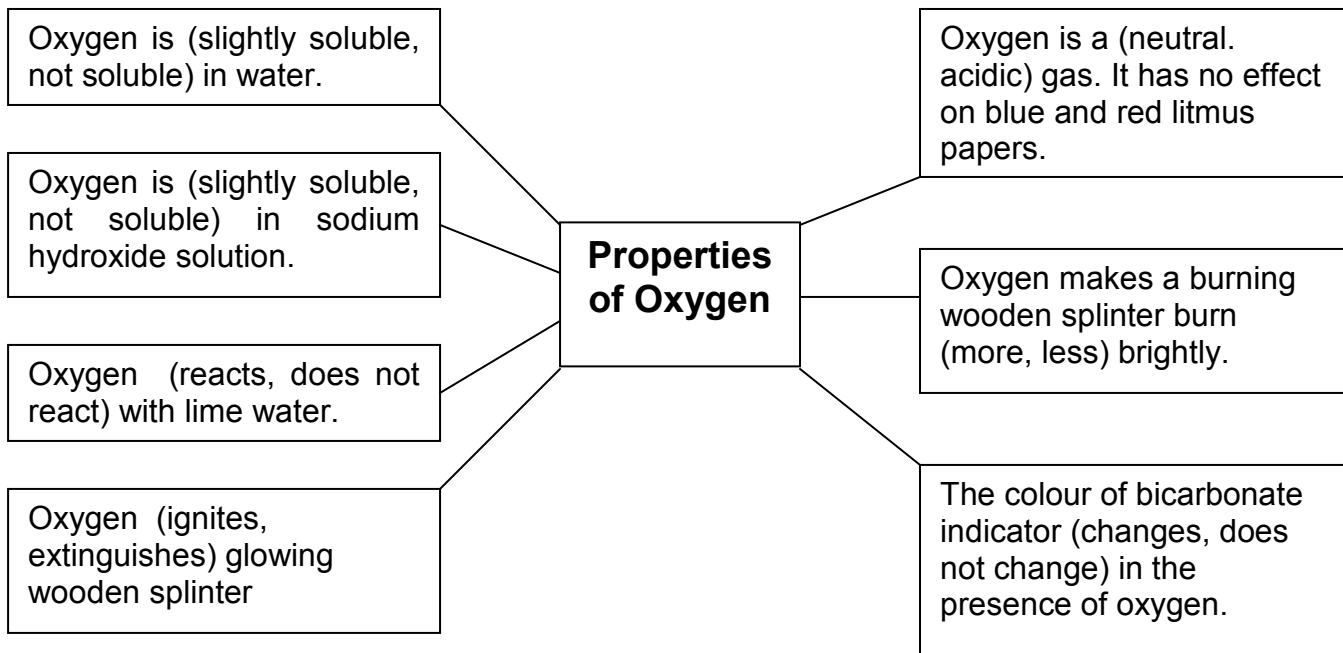
**CARBON DIOXIDE**



Lime water turns cloudy, chalky and milky

**Review 2**

1. Choose the correct answers in the brackets.



## OXYGEN IS NEEDED FOR RESPIRATION

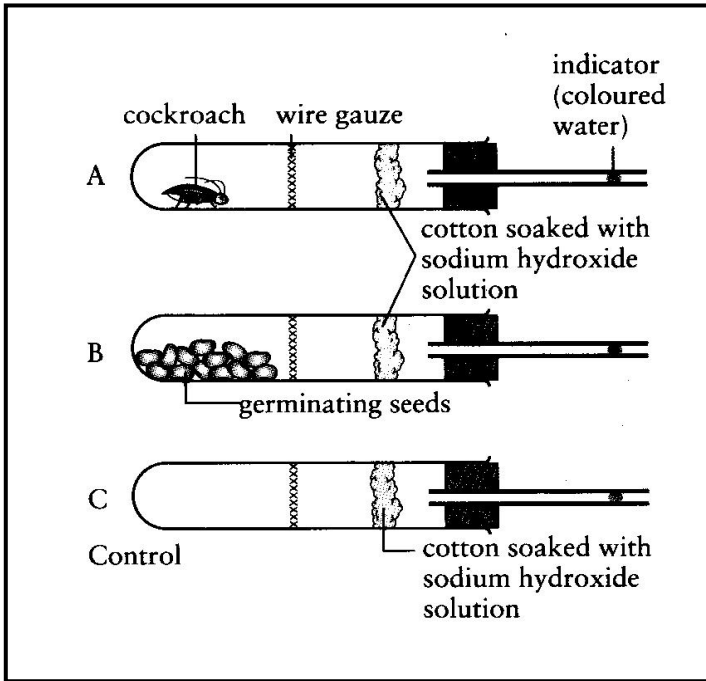
- ⊗ **Oxygen** is needed by all living organisms for the respiration process.
- ⊗ Respiration involves the **oxidation of glucose** (food) and the production of **carbon dioxide, water vapour** and **energy**.
- ⊗ The body gets oxygen that is needed for respiration when inhaled air enters the lungs.
- ⊗ **Inhaled air** – the air that is breathed in during respiration.
- ⊗ **Exhaled air** – the air is breathed out during respiration.

### Composition of Inhaled Air and Exhaled Air

Gas	Inhaled Air	Exhaled Air
Nitrogen	78%	78%
Oxygen	21%	16%
Carbon dioxide	0.03%	4%
Inert gases	1.0%	1%
Water vapour	Varies	Saturated
Temperature	25°C	37°C
Heat	Less	More

**Glucose + Oxygen → Carbon dioxide + Water + Energy**

**To show living things use oxygen during respiration**



**Observation :**

- The drop of coloured water in tubes A and B **move towards** the tube.

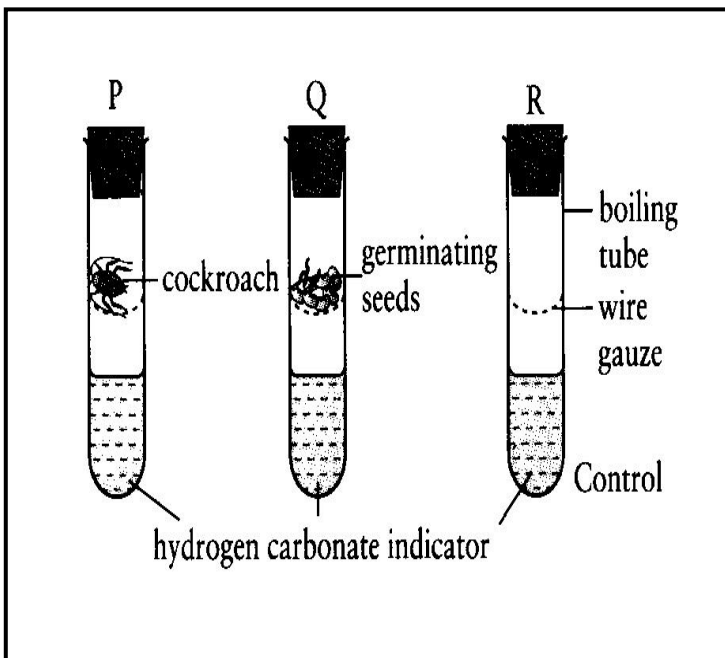
**Discussion :**

- Cockroaches and germinating seeds (living things) take in oxygen and give out carbon dioxide during respiration.
- Carbon dioxide is absorbed by sodium hydroxide.
- Pressure inside tube A and B decrease.
- Higher pressure outside pushes the drop of coloured water towards the tubes.

**Conclusion:**

Living things used oxygen during respiration.

**To show that living things give out carbon dioxide during respiration**



**Observation :**

- The colour of hydrogen carbonate indicator in tubes P and Q change from red to yellow.

**Discussion :**

- Cockroaches and germinating seeds (living things) give out carbon dioxide during respiration.
- Hydrogen carbonate indicator absorbs the carbon dioxide and changes colour from red to yellow.
- 

**Conclusion:**

Living things give out carbon dioxide during respiration.

<b>Review 3</b>
-----------------

1. Tick ( ✓ ) the correct statements.

(a) The cells in our body carry out respiration to obtain energy from food.

(b) Oxygen is needed for respiration.

(c) Carbon dioxide is a by- product of respiration.

(d) Inhaled air has more carbon dioxide than exhaled air.

(e) exhaled air contains about 16% of oxygen.

(f) Inhaled air contains more water vapour than exhaled air.

(g) Nitrogen is not used in respiration.

(h) Living things use oxygen during respiration.

(i) Living things give out carbon dioxide during respiration.

(j) Inhaled air contains more nitrogen than exhaled air.

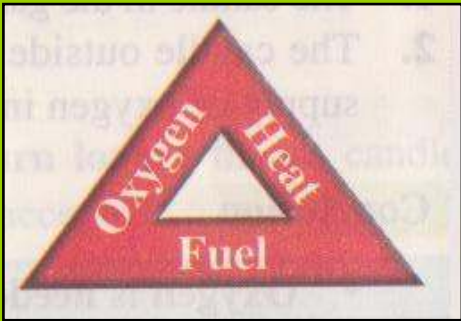
2. Complete the following table.

<b>Gas</b>	<b>Inhaled Air</b>	<b>Exhaled Air</b>
Nitrogen		78%
Oxygen		
Carbon dioxide	0.03%	
Inert gases	1.0%	1%
Water vapour	Varies	
Temperature	25°C	37°C
Heat	Less	

# OXYGEN IS NEEDED FOR COMBUSTION

⚡ Combustion is a process of burning substances that gives of heat and light.  
 ⚡ Condition for combustion are :
 

- ☑ Oxygen
- ☑ Heat
- ☑ Fuel



- ### IMPORTANCE
- **Industry**
    - ❖ Burning of fuel to generate electricity in power station.
    - ❖ Boiling water to produce steam to turn the turbines.
  - **Transportation**
    - ❖ Burning of petrol or diesel in engines to move the vehicles.
    - ❖ Burning the kerosene in aircraft engine to produce energy to fly.
  - **Others**
    - ❖ Burning of candles as source of light.
    - ❖ Burning of natural gas for cooking.

### Combustion of carbon

⚡ Produces **carbon dioxide, heat and light.**  
 ⚡ Example:

Charcoal + Oxygen  $\longrightarrow$  Carbon dioxide + Heat + Light

Product of Combustion

### Combustion of hydrocarbon

⚡ Produces **carbon dioxide, water, heat and light.**  
 ⚡ Example:

Kerosene + Oxygen  $\longrightarrow$  Carbon dioxide + Water + Heat + Light

The water formed by combustion of hydrocarbon can be tested with :

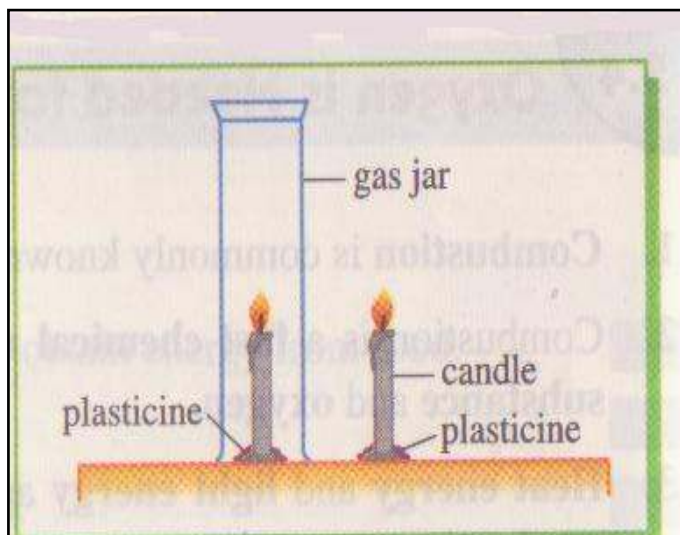
- ⊗ **Dry cobalt chloride paper ( blue to pink)**
- ⊗ **Anhydrous copper sulphate ( white to blue)**

### Methods To Put Out A Fire

Remove fuel	Take away fuel from fire source.
Remove oxygen supply	Using fire blanket, sand, cloth.
Remove heat	Using water



**To show that oxygen is needed for combustion**



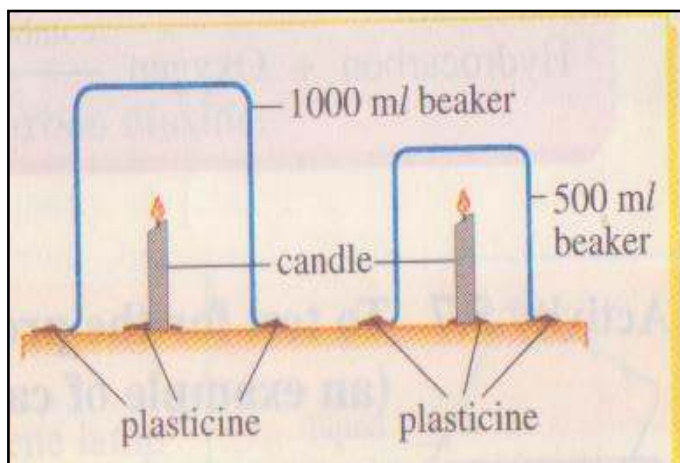
**Observation :**

- The candle inside the gas jar goes out after a short while.
- The candle outside the gas jar continues to burn

**Conclusion:**

Oxygen is needed for combustion.

**To investigate the effect of the size of a container on the length of time a candle burns.**



**Observation :**

- The candle in the 500 ml beaker goes out first.
- The candle in the 1000 ml beaker continues to burn for some time before it goes out.

**Conclusion:**

The bigger the size of container, the longer the time for candle to burn.

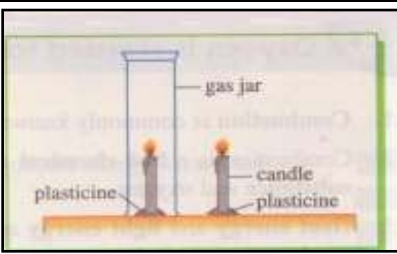
**Review 4**

1. Fill in the blanks in the sentences below by using the word give.

water vapour	hydrocarbon	oxygen	heat energy
fuel	carbon	carbon dioxide	

- (a) Combustion is a chemical reaction between a substance and \_\_\_\_\_ which produces heat and light.
- (b) Oxygen, \_\_\_\_\_ and enough amount of heat must be available for combustion to take place.
- (c) During combustion, the chemical energy stored in a fuel is changed into \_\_\_\_\_ and light energy.
- (d) Charcoal and coal are examples of \_\_\_\_\_.
- (e) Petrol, natural gas, kerosene and diesel are examples of \_\_\_\_\_.
- (f) The combustion of charcoal gives out heat energy, light energy and \_\_\_\_\_.
- (g) The combustion of kerosene produces carbon dioxide, \_\_\_\_\_, light energy and heat energy.

2. Complete the following table.

Situation	Material or apparatus for the investigation	Variable that		
		Is kept constant	Is manipulated	Responds
1				
2	