To investigate the effect of the light intensity on photosynthesis with different concentration of Carbon Dioxide.

Investigating the effect of light intensity on photosynthesis having two samples of a certain plant with 2 different carbon dioxide conce ntrations.
H :There is **no** significant difference between the rate of photosynthesis of plants in different concentration of CO at different light intensities.
H :There is **a** significant difference between the rate of photosynthesis of plants in different concentration of CO at different light intensities.
The oxygen bubble coming off as a result of photosynthesis of plant in certain period of time (5 minutes) is collected and the volume of oxygen bubble is worked out.
This volume is used for working out the rate of photosynthesis of the plant in a certain light intensity and CO concentration.
Then the rate of photosynthesis of each sample of the plant, which has a different CO concentration, is recorded in 6 light intensities and the results are compared with each other.
The results confirmed that as the light intensity decreases, the rate of photosynthesis decreases more for the plant with lower concentration of CO than the plant with higher concentration of CO .
As light intensity and CO are chief external factors, which affect the rate of photosynthesis, and no photosynthesis occurs in the absence of light and CO is needed in the light independent reactions of photosynthesis.

Introduction:
Hypothesis:
H :There is **no** significant difference between the rate of photosynthesis of plants in different concentration of CO at different light intensities.
H :There is **a** significant difference between the rate of photosynthesis of plants in different concentration of CO at different light int ensities.
Photosynthesis:
All living organisms need energy for growth and maintenance. Autotrophic organisms are able to use external source of energy in the synthesis of their organic food materials, whereas heterotrophic organisms must be supplied with ready-made organic compounds from which to derive their energy. Algae, green plants and certain prokaryotes can obtain the energy for synthesis directly from the sun's radiation .It is then used to build up essential organic molecule. Such organisms are called photosynthetic and possess especial pigments, which can absorb the necessary light energy.
The process of photosynthesis:

Photosynthesis in green plants is the process in which energy from the sun is transformed into chemical bond energy in organic molecules. It is a process in which energy is transduced from one from to another and results in the inorganic molecules, carbon dioxide and water, being built up into organic molecule. Oxygen is produced as a waste product. In green plants, the first stable organic molecules to be formed in photosynthesis are simple sugars, which can be used as source of energy or used in the synthesis of other organic molecules. The general equation for photosynthesis can be written as:

$$CO + 2H O \xrightarrow[\text{chlorophyll}]{\text{light}} (CH O) + O + H O$$

Carbon Dioxide + water $\longrightarrow$ carbohydrate + oxygen + water

Photosynthesis occurs in two stages:

- The light –dependent stage, which require light energy and results in the production of ATP (adenosine triphosphate) and NADPH (reduced nicotinamide adenine dinucleotide phosphate)
- The light –independent stage in which the NADPH is used to reduce carbon dioxide to carbohydrate, ATP is required in this stage.

From the direct products of photosynthesis, green plants can synthesise proteins, polysaccharides, lipids and nucleic acids, all of which contribute to the structure and functioning of cells and organelles. In addition, the sugars and the polysaccharide starch form energy stores. During respiration, the sugars are oxidised to carbon dioxide and water, releasing energy, which is stored in molecules of ATP ready for use in cellular activities such as the synthesis of new protoplasm (growth), active transport and movement of protoplasm.

In addition to raw materials carbon dioxide and water, a supply of mineral ions is necessary for amino acid and, subsequently, protein formation. Carbon dioxide is obtained from the atmosphere and enters and plants through the stomata on the aerial parts, especially the leaves.

The water and mineral ions are obtained from the soil and are transported through the plant in the xylem tissue from the roots to the leaves. Water is necessary for all living process especially for photosynthesis. Water is

continually taken up by green plants to maintain the turgidity of the tissue and to replace that lost in transpiration. The amount of water needed in photosynthesis is small compared with that taken up and lost through transpiration.

		Length of oxygen bubble (mm)			
Distance lamp away (cm)	Light intensity (Arbitrary ~~units~~)	First reading	Second reading	Third reading	Mean
5	1000 / 25	2.3	2.7	2.5	2.33
10	1000 / 100	1.8	1.9	1.6	1.77
15	1000 / 225	1.2	1.4	1.0	1.2
20	1000 / 400	1.0	1.3	1.1	1.13
25	1000 / 625	1.0	0.9	1.1	1
30	1000 / 900	1.0	0.8	1.1	0.97

Results:

The table to show the length of oxygen bubble in the plant with 0.5% carbon dioxide concentration.

Analysis:

It can be seen from the tables and graphs that when the light intensity decreases, the length of oxygen bubble decreases and so the volume of oxygen bubble and therefore the rate of photosynthesis decreases as less oxygen has evolved and this is because light becomes a limiting factor.

In the first plant which has higher carbon dioxide concentration when the light intensity decreases between 5 to 30 cm away from the beaker the length of the oxygen bubble decreases from 3.87 to 2.17 mm and also the oxygen bubble volume decreases a lot with a steep gradient when the light intensity decreases from 40 to 10 (1000/d). And the graph of rate of photosynthesis shows that the rate of rate of photosynthesis has decreased too as the light intensity decreases. After that even though the rate is still decreasing but the gradient is not as steep as before and the curve slowly levels off.