Reading with a focus

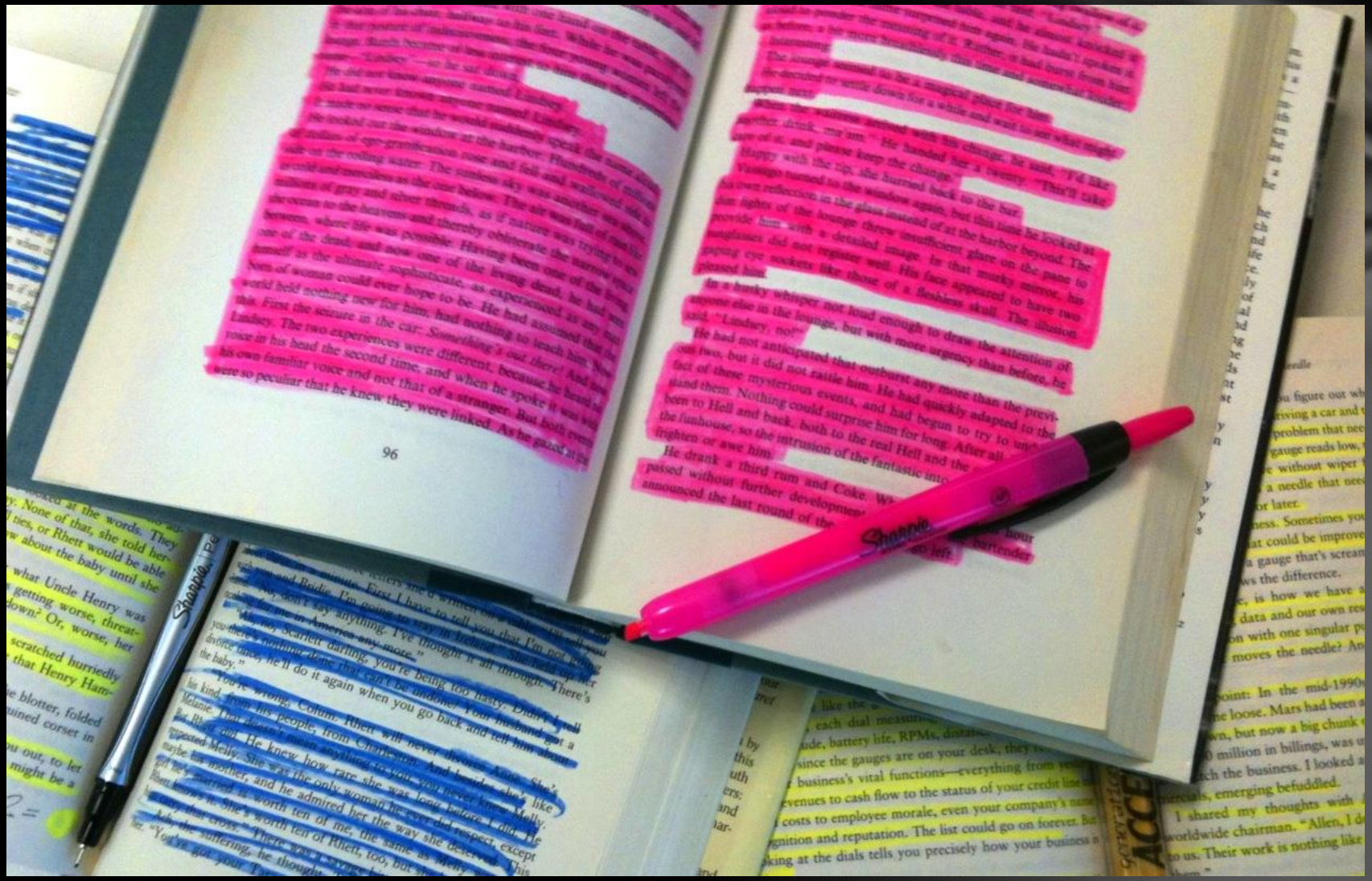
Success Criteria for you

To realise the limitations of reduction type studying

To use reduction technique to convert general understanding of texts into own words.

To acknowledge the use of creating focus questions

Options...




DON'T FORGET
DON'T FORGET
DON'T FORGET
HELP!
DON'T FORGET
DON'T FORGET

Chapter 25 Nutrition in the flowering plant

Learning objectives After studying this chapter, you should be able to:

- Describe the absorption and transport of water, carbon dioxide, minerals and the products of photosynthesis through a plant.
- Name one example of a root, stem and leaf modification as a food storage organ.
- HL ○ Outline the cohesion-tension model of water transport in xylem tissue.

Introduction

All plants are **photosynthetic** – a type of autotrophic nutrition. They contain chlorophyll, a green pigment responsible for capturing the energy of light (*see* Chapter 11).

In order for photosynthesis and other metabolic processes to occur, plants require water, carbon dioxide, oxygen and minerals.

Water and mineral uptake by the roots

Water is one of the raw materials needed for photosynthesis to occur. It is also the medium in which many metabolic reactions take place. Water enters a plant at the roots. The root system is specifically designed to absorb water and transport it very quickly to where it is needed.

As we learned in Chapter 24, the roots are composed of root hairs, ground tissue (cortex), and xylem and phloem. The root hairs, cortex and xylem are involved in water and mineral uptake.

Minerals are water soluble. They are vital to the health of the plant and are needed in many different metabolic reactions. For example, magnesium is required in the formation of chlorophyll molecules and calcium is needed for the formation of the middle lamella, the cement that holds the plant cells together (*see* Chapter 3).

Other soluble substances absorbed by the roots include nitrates and phosphates, which are essential for DNA replication (*see* Chapter 14) and protein synthesis (*see* Chapter 15).

Water and mineral uptake by the roots is also helped by fungi. Fungi in the soil are composed of long hyphae (*see* Chapter 21), which intertwine with the roots of plants. This increases the surface area for absorption of water and minerals.

- Water first enters the root hairs by osmosis. We learned in Chapter 8 that osmosis is diffusion of water molecules from a region of high water concentration to a region of low water concentration, across a semi-permeable membrane.
- Water in the soil is less concentrated with solutes than water in the cytoplasm of the root cells. Therefore, water moves across the root hair membrane by osmosis.
- Root hairs are extremely small extensions of the root epidermal cells. They have thin walls and a large surface area, maximising uptake of water and minerals.
- Once the water has entered the root hair it diffuses across the root cortex (ground tissue) towards the xylem.

Water and mineral transport through the plant

Water builds up in the xylem, creating **root pressure.** Root pressure pushes the water molecules up the xylem vessels and tracheids.

However, root pressure is not strong enough to push water up to the top of tall trees. The maximum measured root pressure in a plant is only enough to raise water 7 m high in the plant. Another factor is responsible for enabling water to be moved up to great heights – **transpiration.**

! **Transpiration** is the loss of water vapour from the aerial parts of a plant.

Transpiration helps to keep water moving upwards through the plant. Each water molecule pulls on the rest behind. This force is transferred the entire length of the xylem tissue. The movement of water upwards through a plant is called the **transpiration stream.**

2.2 History of the Atom

- Ancient Greek philosophers proposed that matter was composed of small, indivisible particles.
- In 1808 John Dalton put forward an Atomic Theory based on a number of experiments he had performed with gases. This theory proposed that:
  1. All matter is made up of minute particles called atoms.
  2. All atoms are indivisible, i.e. they cannot be broken down into simpler particles.
- The idea that atoms are indivisible was discredited by a series of discoveries in the late 19th century. These discoveries found that atoms could be broken down into simpler particles.

2.3 Discovery of the Electron

William Crookes (Cathode Rays)

- In 1875 William Crookes investigated what happens when an electric current is passed through a glass tube containing air at low pressure (vacuum tube). The glass of the tube was seen to fluoresce, suggesting that it was being struck by some form of radiation.
- Crookes realised that this radiation was being emitted from the cathode, because a shadow of the Maltese Cross was formed at the opposite end of the tube to the cathode, Fig. 2.2. Hence he gave the name "cathode rays" to the radiation.

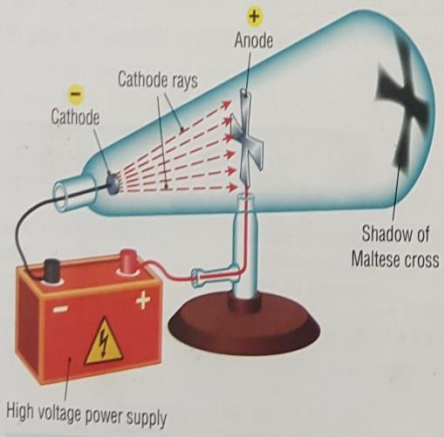


Fig. 2.2 Rays emitted from the cathode strike the Maltese Cross and create a shadow. The sharpness of the shadow shows that cathode rays travel in straight lines.

- A second experiment carried out by Crookes is illustrated in Fig. 2.3. This shows that cathode rays have enough energy to turn the paddle wheel.

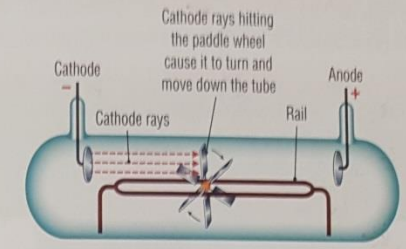


Fig. 2.3 The cathode rays strike the paddle wheel, causing it to rotate and travel down the tube.

J.J. Thomson (Discovered the Electron)

- In 1897 J.J. Thomson showed that cathode rays consisted of negatively-charged particles, which he called **electrons** (a name that had been suggested some years earlier by Irish scientist George Stoney).
- He passed a narrow beam of cathode rays through a small hole in the positive electrode (anode) of a vacuum tube. The beam passed between two parallel plates and struck a fluorescent screen at the far end of the tube. This caused the fluorescent screen to glow, Fig. 2.4.

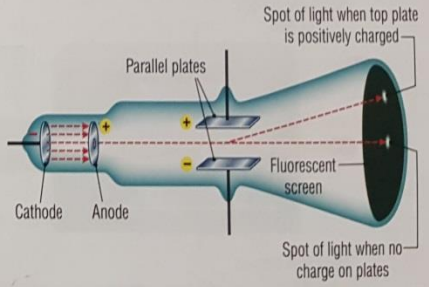
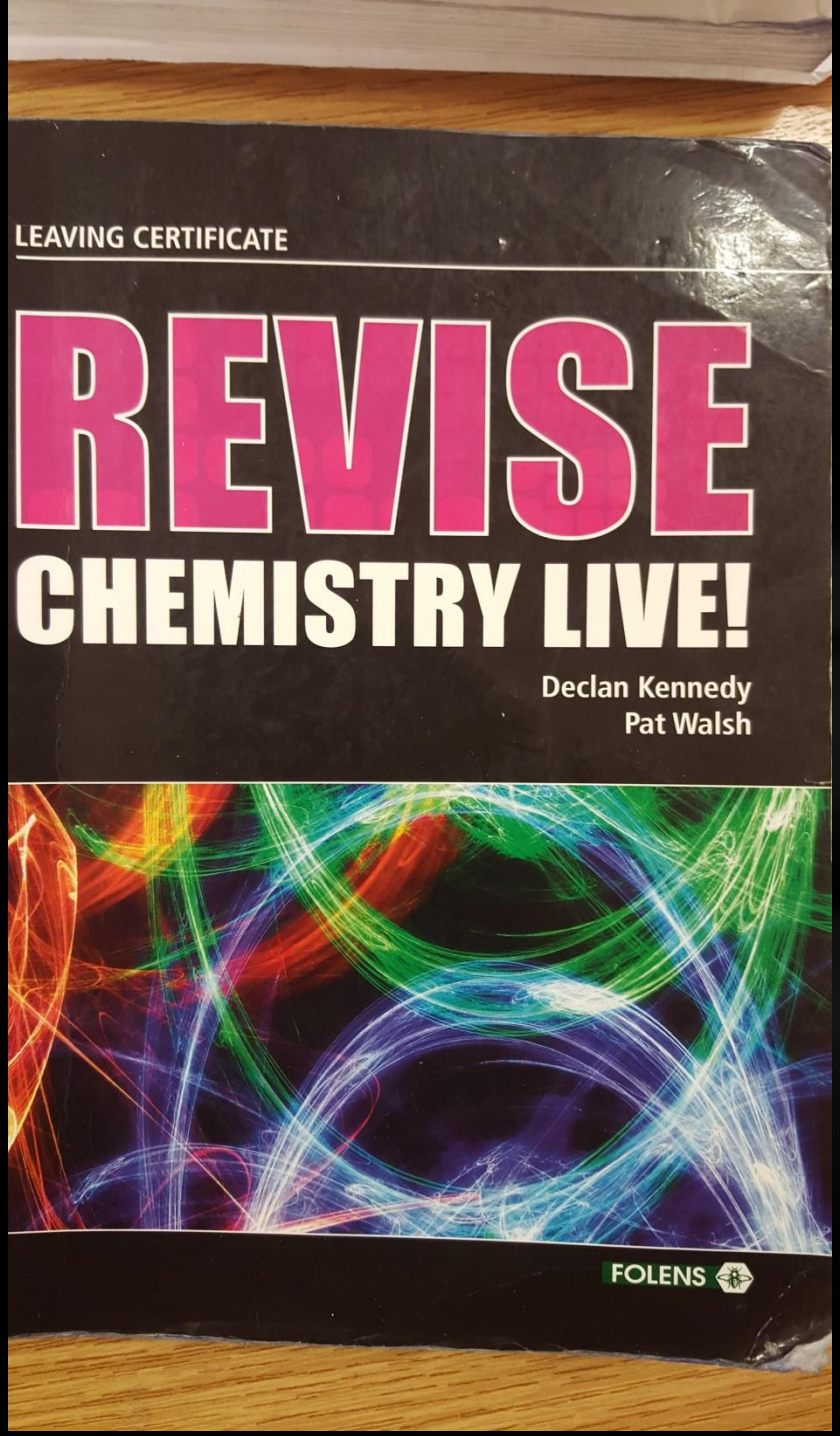


Fig. 2.4 The cathode rays are attracted towards the positively-charged plate, showing that the rays are themselves negatively-charged particles.

- When a positive charge was placed on the top plate, the cathode rays were attracted towards the positively-charged plate, showing that the rays must consist of negatively-charged particles.
- Thomson was able to use a magnetic field to cancel out the effect of the electric



The Atom chapter 1

- The idea that materials are made up of small particles is referred to as the particle nature of matter.
- Diffusion: Diffusion is known as the spreading of Gas. eg Ammonium & hydrochloric acid → Ammonium Chloride. Diffusion of a liquid eg: copper sulfate crystal placed in a large graduated cylinder + water, after a few hours, the blue colour spread throughout the liquid, this is known as diffusion.

The History of the Atom.

Greek philosophers (400 BC)
- The first to propose that matter was composed of small particles.
- Democritus They/he believed that tiny particles were so small that they couldn't be broken down. 'indivisible', 'atomos' → atom.

John Dalton (English) 1766- 1844
- composed book of numerous experiments he had performed with Gases' 1808

Daltons Atomic Theory
All matter is made up of very small particles called atoms

All atoms are indivisible, They cannot be broken down to smaller particles.

Process

Book

Highlighter

Revise wise/Less Stress

Highlighter

Own notes

Read own notes

Read own notes

How many of you mainly just condense/ reduce the material when note taking?

Actual Question 2015 LC Chemistry

Rutherford concluded around 1910 that the electrons in an atom are located in a large, almost empty space surrounding a tiny, dense, positive nucleus. State three observations made by Rutherford's team when they bombarded gold foil with alpha-particles. Explain how Rutherford deduced from these observations that the nucleus is

(i) Positive

(ii) Small and dense

How do we learn?

- "*You need to do something with the material in order to learn. Reading is not learning*".
- Highlighting and post its can work in **reducing material**
- However introducing focus questions to your revision really helps.
- **How do we create the Focus questions for studying??????**

How?

Ask your teacher.

Look at old examination papers

Read marking schemes

Read Chief Examiners reports

Consider the How? And the Why?