2023

NEW

HARROAN S.1 CHEMISTRY

Learner's book

Second edition

With 100 Lesson periods

2023

Guide notes
Group activities
Project guidelines
Practical Questions
And more

Revised from 2022 version and reviews from those who used it

HARROAN'S

New curriculum work book for

2023

s.1

Chemistry

This book has been made & revised basing on new curriculum for lower secondary education syllabus

Student's information.

This book belongs to:

Name .....

School .....

Class .....

Stream .....

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CHAPTER 01 CHEMISTRY AND THE SOCIETY

By the end of the chapter you should;

- Understand what is chemistry
- Know why chemistry is studied
- Know how chemistry relates with other subjects.
- Understand the importance of chemistry.
- Know the contributions of chemistry to Uganda's economy and how they differ in different organisms.

NCDC TOPIC PROPOSED TIME FOR THE CHAPTER

Lesson Periods – 6

Weekly periods – 3

Coverage time – 2 weeks

Lesson period 1 1.1 Nature of chemistry

Introduction to lesson; In this period, you are required to identify different substances made up of chemicals. Present your letter before the class

Lesson learning objectives;

- To define chemistry
- To identify different substances made up of chemicals

Nature of chemistry.

In primary, you studied science. But have you ever wondered about how the science you studied applies in everyday life. For example, have you ever wondered how tea leaves change the color of hot water when added or why does sugar make the tea sweet. Have you ever wondered why shiny metals develop a brown coating on them?

As you go on with Chemistry you will understand that chemistry is all around us and it's a branch of the science you studied in primary but which specifically deals with studying matters and changes that occur to substances under different conditions.

Hence, chemistry is the study of mater and the changes that occur to substances under different conditions

Chemistry studies the properties of natural and manmade chemicals. This information is used to understand how some chemicals may be modified to make them more useful.

Examples of some products which contain chemicals

1. Soap

When dissolved in water, soap possess the ability to remove dirt from the surfaces such as human skin, textile and other solids. Chemicals with in soap include sodium benzoate, sodium carbonate, sodium hydroxide etc. these chemicals are used to produce lather and bubbles in soap

2. Baking power

Is a leavening agent used to increase volume and lighten the texture of baked products? Baking powder contains chemicals like sodium carbonate, acidic salts and other carbonates

Group activity1a.

. In groups of 3 to 4 students, look at the pictures below of the common things in everyday life. Identify those ones made up of chemicals and those ones which are not.

a) Discuss about each picture in your groups, write in the table below the name of things which have chemicals and those which lack chemicals.

Things made up of chemicals	
Things not made up of chemicals	

ii) Apart from what has been placed in the pictures, Identify other common things around us which are made up of chemicals. Give as many as members in your group can suggest.

……

……

Activity 1b.

Write a letter to your friend about the different substances at your home which contain chemicals and those which don't. Your letter should contain address, greeting remarks, substances in your home which contain chemicals and those which don't

Lesson period 2 1.2 Reasons why we study chemistry

Introduction to lesson; In this period, you are to discuss about the occupations related to chemistry

Lesson learning objectives;

- To identify reasons why we study chemistry
- To outline different occupations in chemistry

Guide notes

Reasons why we study chemistry

1. Chemistry equips us with skills which open up many career options like pharmacists, industrial chemists
2. Chemistry helps us to understand processes in daily life activities. E.g. changing of the colour of hot water when tea leaves or a tea bag is added
3. Chemistry provides us with basic knowledge to read and understand labels on various products
4. Chemistry provides us with knowledge of making new products by mixing the available raw materials to various conditions
5. Chemistry knowledge's us with the impact of environmental pollution and ways we can prevent it

Occupations in chemistry

Pharmacist

Is a healthcare professional who prepares, controls, formulates, preserves and distributes medicines

Chemistry enables pharmacists to understand chemical compositions of various Pharmaceuticals to suit patient's needs. Examples of pharmaceutical products include, Injections, tablets, drops inhalers, capsules, syrups.

Group activity 2.

Below are various chemistry related occupations. Discuss, about each of them more so on what each of them does. Use the internets and text books for research.

Industrial chemist

Quality control chemist

Water chemist

Chemical engineer

Laboratory technician

Chemistry teacher

CHAPTER 02 EXPERIMENTAL CHEMISTRY

By the end of the chapter you should;

- Know laboratory apparatuses.
- Know laboratory rules and regulations.
- Identify substances using melting and boiling points
- Know the scientific method of investigation

NCDC TOPIC PROPOSED TIME FOR THE CHAPTER

Lesson Periods – 12

Weekly periods – 3

Coverage time – 4 weeks

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Lesson period 7 2.1 laboratory rules and regulations

Introduction to lesson; In this period, you are required to outline the laboratory rules each with its reason

Lesson learning objectives;

- To outline rules in the laboratory
- To plan designing chart showing some of the rules

Guide notes

Laboratory rules and regulations.

A laboratory is a place where scientific experiments are carried out and where scientific equipments are kept.

Some of the Rules in the laboratory.

1. Carry out only experiments suggested by the teacher.
2. Do not eat or drink in the laboratory.
3. In case of accidents, report to the laboratory technician.
4. Always follow instruction given.
5. Avoid unnecessary movements in the laboratory.
6. Use clean and dry apparatuses when in the laboratory.
7. Handle your apparatus with great care.
8. Don't taste or smell gases.
9. Never use faulty apparatus.

Group activity7; carryout research and state the importance of each of the rule above. Present your findings to the rest of the class.

Planning to design a chart showing the laboratory rules.

For the remaining time make a group plan on how to design a chart showing some of the laboratory rules

Guidelines

Choose which rules will you portray on the chart

Choose which material you want to come up with a poster or chart

Discuss on how it will be unique

Divide what to be done in time intervals

You are to present your chart or poster in lesson period 9

Lesson period 8 2.2 safety in the laboratory

Introduction to lesson; For this period, you are required to understand safety precautions in the laboratory.

Lesson learning objectives;

- To identify most common accidents in the laboratory
- To interprete the different laboratory symbols

Guide notes

Safety in the laboratory.

Safety measures and precautions need to be taken in the laboratory to prevent accidents. The most common accidents are in the laboratory include;

i) Fire out break

ii) Burns

iii) Scalds

iv) Falls

Group activity 8a

The picture below shows a particular laboratory safety equipment. In groups of 3 to 4 students, study the picture below and use it to answer the questions that follow

a) (i) Name the equipment

……..

(ii) Sate the use of the equipment.

……..

b) Outline the procedure of using that equipment

……

……

……

……

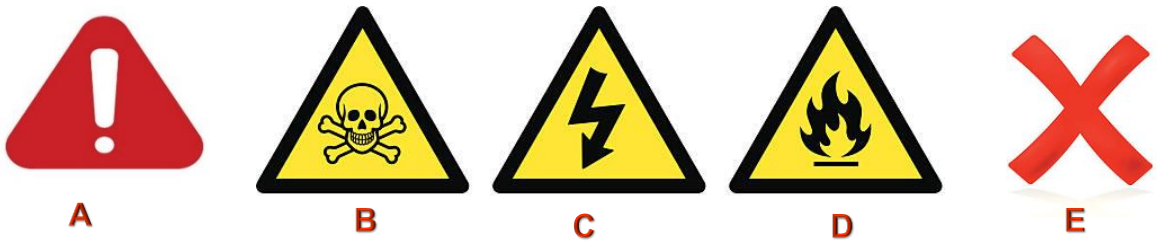
c) Apart from a laboratory, give three other places where we can find that equipment.

……

……

Group activity 8b

Safety symbols are found on labels of containers and on bottles containing dangerous chemicals. Identify the symbols below and give their meaning



Symbol A is Irritant.

It means these substance can irritate your eyes and skin causing itchiness, soreness, redness and blistering.

Lesson period 9

Introduction to lesson;

Lesson learning objectives;

2.3 Laboratory equipments

In this period, you are required to outline the importance of different laboratory apparatuses

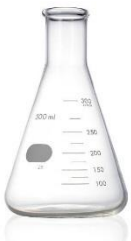
- To outline the examples of laboratory equipments
- To state the use of each laboratory equipment

Group activity 9

Laboratory apparatus and materials.

Observe the pictures of different apparatuses and materials used in the laboratory. Research about each of them more so their uses in the laboratory. In your groups, discuss about each of the apparatuses and write its use then present to the class

Separating funnel



Conical flask

Burette

Beaker

Dropper

Lesson period 13

2.7 Using the scientific method on physical separation

Introduction to lesson; In this period, you are to learn how the scientific method is carried out and how a report is written

Note, in this period, you are to learn how to apply the scientific method and use the knowledge to do activities in the coming lesson periods

Group activity 12

Imagine your teacher left samples of sulphur and iron fillings in the laboratory separately and one of your friends mixes them accidentally. How would you separate them such that the teacher finds separate samples as they were?

Using the scientific method to separate a mixture of iron and sulphur

Observation; a mixture of yellow and black solids

Qn; which property of the two solids can we use to separate? (Iron is magnetic and sulphur is not)

Hypothesis; A mixture of sulphur and iron could be separated using a magnet

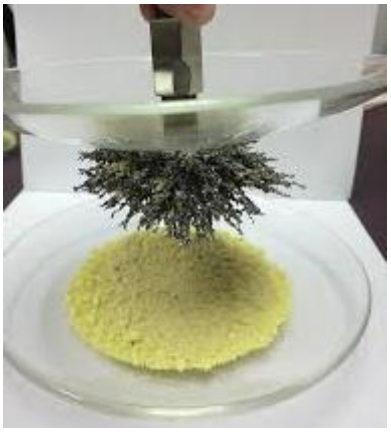
Planning the experiment to test for our hypothesis; we plan to put the mixture on a Petridish then pass a magnet over it such that it attracts the magnetic substance

Carrying out an experiment to test our hypothesis

Procedure

- Place the mixture of sulphur and iron feelings on a Petridish
- Pass the magnet over the mixture in a Petridish
- Leave the magnet over the mixture until all the iron filling are attracted

Results



Iron fillings are attracted by the magnet but the sulphur powder is not

Analyzing the results

One of the substances in the mixture (iron) is attracted by the magnet

Therefore our hypothesis is true.

Note if the results don't support the hypothesis, change the hypothesis and try again.

Conclusion

A mixture of iron and sulphur can be separated using a magnet

A report on an experiment carried out to separate a mixture of sulphur and iron fillings

1st JAN 2023

Purpose: *to separate a mixture of sulphur and iron fillings*

Introduction; *we noticed that yellow powered sulphur and grey iron fillings formed a mixture which couldn't easily separate using our hands*

Our hypothesis; *a mixture of iron and sulphur could be separated using a magnet*

Planning our experiment; *We planned to place the mixture of iron and sulphur on a Petridish then pass a magnet over it and observe whether one of the substances would be attracted*

Procedure

- *Place a clean Petridish on the table*
- *Place the mixture of iron and sulphur in the Petridish*
- *Pass a magnet over the mixture and leave it for some time over the*

Observation

The grey iron filling were attracted to the magnet

Analysis

The iron fillings are magnetic thus were attracted by the magnet. The sulphur powered is not magnetic and it was not attracted by the magnet

Discussion

The experiment went on very well except that some yellow stains of sulphur were still attached on the iron filling on the magnet.

We think we could improve the results seen by using a stronger magnet

Conclusion

A mixture of sulphur powder and iron fillings is separated by a magnet

By;

Bitamazire Jonah

Nakabiti Jennifer

Nabitumbuwa Joan

Batemyetto John Bosco

Lesson period 14 2.8 scientific method on filtration

Introduction to lesson; In this period, you are required to develop a hypothesis on separating a mixture of sand and salt

Lesson learning objectives;

- To separate a mixture of sand and salt using a scientific method

Requirements

- A mixture of sand and salt
- Laboratory apparatus

Guiding statement

Your mother sends you to buy salt at the shop. As you are coming back with it, you accidently fall down pouring the sand on the salt which mixes with the sand on the ground. You try collecting the salt but it has alot of sand mixed in it. Assuming your school laboratory is open and you would like to take salt back to your mom. Suggest a hypothesis you would come up with to separate the mixture. Carry out the experiment using the laboratory apparatus and write down your report in the space below

CHAPTER 03 STATES AND CHANGES OF MATTER

By the end of the chapter you should;

- Be able to identify the different states of matter
- Be able to understand how substances change from one state of matter to another
- Be able to know what happens to particles when heated
- Be able to describe the cooling and heating curves.
-

NCDC TOPIC PROPOSED TIME FOR THE CHAPTER

Lesson Periods – 09

Weekly periods – 3

Coverage time – 3 weeks

Lesson period 19 3.1 defining matter

Introduction to lesson; For this period, you are to define matter and outline its different examples

Lesson learning objectives;

- To define matter
- To outline different examples of matter

Guide notes

1 Defining matter

Matter is anything which has mass and occupies space.

A book is matter, a computer is matter, food is matter, and dirt in the ground is matter. Sometimes matter may be difficult to identify. **For example**, air is matter, but because it is so thin compared to other matter (e.g., a book, a computer, food, and dirt), we sometimes forget that air has mass and takes up space. Things that are not matter include thoughts, ideas, emotions, and hope

Group activity 17a,

Identify whether the following is matter or not. Give a reason for your answer.

a) Pancakes

Is it matter

.....

Reason

.....

b) Love

Is it matter

.....

Reason

.....

c) The moon

Is it matter

.....

Reason

.....

d) An idea of a new invention.

Is it matter

.....

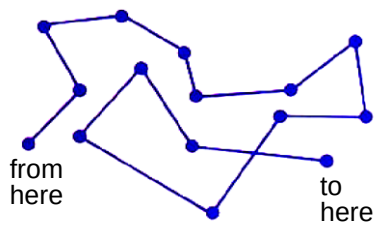
Reason

.....

Matter is made up of particles.

Rock, air, and water look very different. But they have one big thing in common: they are all made of very tiny pieces, far too small to see. For the moment, we will call these pieces particles. In fact everything around you is made of particles – and so are you!

The particle moves in a random way, changing direction every time it hits another particle. We call this random motion



Group activity 17b,

In groups of 3 to 4 students, identify the solids, liquids and gases in the pictures and write them in the table below

CHAPTER 04 USING MATERIALS

By the end of the chapter you should;

- Know the materials used in everyday life
- Know how common materials pollute the environment
- Understand properties of different materials
- Understand polymers and their use in daily lives

NCDC TOPIC PROPOSED TIME FOR THE CHAPTER

Lesson Periods – 09

Weekly periods – 3

Coverage time – 3 weeks

Lesson period 28 4.1 classifying materials as natural and synthetic

Introduction to lesson; For this period, you are to classify materials as natural or synthetic

Lesson learning objectives;

- To define natural and synthetic materials
- To give examples of natural and synthetic materials
- To describe how a material being natural or synthetic

Guide notes

Materials

A material is any substance that an object is made from. E.g. glass, plastic, clay etc. All materials are made up of matter. Around as, all items are made up of a particular material.

Materials can be classified a natural or synthetic materials basing on where they are obtained.

Natural materials

Are materials that come up from nature without human intervention

Synthetic materials

Are materials made by human through various chemical reactions

Group activity 25

The pictures below show natural and synthetic materials. Write the name of the material besides it then describe it as natural or synthetic.

i) Write the name of the material besides it.

ii) Group the items above as natural and synthetic

Write their names in the table below

Type of the material	Name of item
Natural materials	
Synthetic materials	

Describe the use of each of the material above in daily life

Lesson period 29 4.2 properties of different materials

Introduction to lesson; For this period, you are to describe the properties of a concrete

Lesson learning objectives;

- To describe the properties of concrete

Guide notes

BRITTLE MATERIALS

Brittle materials are materials that can easily break.

Examples of brittle materials include concrete, glass and ceramics.

a) Concrete

Sand

Gravel

Cement

Cement has crystals which start forming when water is added to it and they become stronger if the concrete is allowed to dry out slowly. This is why it is a good idea to wet concrete with water for several days after it has been made to make the strongest structure. Because concrete is made out of crystals, it is quite easily broken with a hammer. Crystalline substances are easily broken.

Concrete can easily be broken with a hammer

Limestone is used in the manufacture of cement.

Group activity 26

The pictures below shows concrete being made. Use it to answer the questions that follow. Carry out research using textbooks and the internet.

a) Briefly describe how concrete is made. (Research from internet)

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.....

.....

.....

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.....

b) Suggest any three properties of concrete

.....

.....

.....

c) Outline four uses of concrete

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.....

.....

.....

Lesson period 30 4.3 Glasses

Introduction to lesson; In this period, you are to describe the properties of glasses and their uses in daily life

Lesson learning objectives;

- To outline properties of glasses
- To describe the uses of glasses

Guide notes

c) Glass

A glass is a hard non-crystalline solid whose molecules are not arranged in any particular pattern.

Properties of glasses

- It is hard
- It is transparent
- It is brittle
- It is non-crystalline

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The structure of glass is like that of a liquid but its molecules are too large to move around, hence glasses are liquids that behave like solids. The most common type of glass is made by heating limestone (calcium carbonate) with sodium carbonate and sand (silicondioxide) in a furnace. The three substances melt together and run out from the furnace as a clear liquid which is then allowed to cool as a flat sheet of glass. This can be moulded into any shape before it cools down and turns into a solid. Other substances like metal oxides can be added to make different kinds of glass.

Group activity 27

The pictures below uses of the glasses in our community

A

B

C

i) Identify the uses of the glasses in the picture below

A.....

B.....

C.....

ii) Identify and describe the property of glass which favours the role stated in ai).

A.....

.....

B.....

.....

C.....

.....

b) The picture below shows a president's car with windows made of glasses which bullets cannot break

i) Which kind of glasses are in the president's car?

.....

ii) Why are those cars made with such glasses?

.....

.....

iii) State why cars in Uganda don't have such glasses.

.....

iv). Outline the various importance of glasses in the community.

.....

.....

.....

.....

.....

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.....

.....

d) Which property is exhibited by the glass in the presidents car

.....

Lesson period 31 4.4 ceramics

Introduction to lesson; In this period, you are to describe the properties ceramics and their uses in daily life

Lesson learning objectives;

- To outline properties of ceramics
- To describe the uses of ceramics

Guide notes

Ceramics

Ceramics are materials made out of soft clay and then hardened by heat. Clay contains a mixture of compounds mainly aluminium oxide and silicon dioxide.

Properties of ceramic materials.

- It can easily be moulded. (it is because molecules in the clay attract water molecules . these water molecules allow the clay molecules to slip easily around each other)
- It becomes hard when it dries.
- It becomes permanently hard when heated with fire.

Project guidelines

A project is an individual or group enterprise that is carefully planned to achieve a particular aim.

For the new curriculum learners are expected to come up with at least one project in chemistry before sitting for their final exams in s.4.

Learners are supposed to come up with their projects basing on what they have studied in relation with environmental problems we face in the society. A project is not given by the teacher though a teacher give learners the guidelines.

Features of a good project

- A project has a fixed set of objectives. Once the objectives have been achieved, it stops to exist.
- A project should have a time period i.e. it has to come to an end
- A project should be unique
- A project can undergo changes throughout its life
- A project should not harm the environment
- A project should be showing innovation and creativity.
- A project should produce a tangible product.

Steps in developing a project.

Step 1. Identifying purpose of a project.

A project's purpose explains the reason why the project exists. The purpose is a direction the project will take and maintain. The purpose also defines the problem and how the project will address it.

Example; making a poster to sensitize people on the effects of pollution.

Step 2. Create a vision for your project

Your vision should define the end goal and addition criteria that will make the project a success. However, it should not focus on one specific way to achieve this end goal. Instead it should allow multiple paths to the desired result.

Step 3. Brainstorm ideas.

Brainstorming is a way to get your ideas on a paper. Basically, you spend time writing out what you want and connecting ideas.

If ideas look to be bad at the start, it's still ok. Keep trying. Try breaking ideas and building them up

Step 4. Pick a focus.

While it may be tempting to pick a broad topic, it will actually be easier if you narrow that down that you won't get lost in many details.

Step 5. Decide on how you want to present your project.

For example for the poster on effects of pollution, will it be coloured or will you use home materials more so wastes

Step 6. Research your focus of the project

After picking a focus, carry out research from internet and textbooks. Get the references which you will even include in your report. Explore ways you can develop your project more so following your focus.

Step 7. Plan out your project

Try sketching it out, make a list of materials you will need before you begin and divide your project into manageable time intervals

Step 8. Create your project

Carry out the project following the manageable time intervals you made.

Step 9. Write a report for your project then present your project product to the teacher with the report.

The pictures below show some of the projects done by students.

Projects done by students on water pollution

A poster on stopping pollution

Project done by students on water pollution

Activity of integration.

You have been given a contract to sensitize people in your community on how to select building materials for constructing a community school. They are expected to gather materials for the walls and roofs. Since they have many people in the community, they will need to deal with waste materials. Plan your sensitization message to the community.

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BOOK OVERVIEW

Harroan s1 chemistry learner's book is a work book made and revised to simplify learner's understanding of chemistry based on the new curriculum.

The book is a development of the 2022 version and has been improved basing on the reviews of those who used the 2022 version

Number of pages – 200

Number of lesson periods – 100

Support structure; Harroan will provide a support to teachers on the expected answers in this work book. For more information read the full book overview pdf document

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