PROTOTYPE

NCDC
NATIONAL CURRICULUM DEVELOPMENT CENTRE

CHEMISTRY
TEACHER'S GUIDE

SENIOR ONE

LOWER SECONDARY CURRICULUM

CONTENTS

CHAPTER 1

Chemistry and Society

Key Words	By the end of this topic, the students should have learnt about:
• Chemistry • Careers • Science • Technology • Society	a) *the discrete nature of Chemistry* b) *why Chemistry is studied and its relationship with other subjects* c) *the importance of Chemistry in everyday life and the careers linked to the study of chemistry* d) *the contribution of Chemistry to the economy of Ugandan*

COMPETENCY: By the end of this topic, the students should be able to assess the application of Chemistry in our everyday life and its contribution to our economy.

Introduction

Explain what competency the learners are expected to acquire at the end of the topic, how this will be acquired and measured as the lesson starts.
Explain that, the learner is able to assess the application of chemistry in our everyday life and its contribution to our economy.

Chemistry is a laboratory science. Its subject materials and theories are based on experimental observation. However, its scope reaches out beyond the laboratory into every aspect of our lives – to our understanding of the nature of our planet, the environment we live in, the resources available to us and the factors that affect our health.

Therefore, in this topic, you should be able to guide learners find out about the application of Chemistry in their everyday life and its contribution to our economy.

1.1: What is the Nature of Chemistry?

Guidance to the Teacher

i) Organise learners in groups of 5-7,
ii) Ask learners to discuss what they already know about Chemistry and common chemicals in pharmaceutics and cosmetics, plastics, food and beverages, soaps and detergents, water treatment, and indigenous chemistry in local environments.
iii) Ask them to produce a mind-map to show their conclusions.
iv) Let them present in a plenary

You have previously learnt that science is a study of living and non-living things. All living and non-living things occupy space and are known as matter. We now look at science as made of separate branches namely: Chemistry, biology and physics.

Each of the branches of science deals with matter in a different way. Physics deals with the relationship between energy and matter, biology deals with living things. In the following activity, you will find out what Chemistry deals with.

Let the learners now give their own explanations of the relationship between chemistry and society.
Then summarise their discussions to bring out how chemistry is important in everyday life.

Activity 1.1: Find out about substances in everyday life that are related to Chemistry.

1 In groups of 5-6, discuss what common things in everyday life you think are made up of chemicals.
2 In your groups, produce a mind-map to show your conclusions.
3 Present your responses in a plenary.

From their discussions, they should be able to find out that Chemistry is all around us. Common Chemicals in pharmaceutics and cosmetics, plastics, food and beverages, soaps and detergents, water treatment, and indigenous chemistry in your local environments are related to Chemistry.

Activity 1.2: Find out products in everyday life made with knowledge of Chemistry.

Observe at the pictures critically and answer the following questions.

Fig 1.1

The above picture shows some common products used in everyday life. The products are obtained using the knowledge of Chemistry.

1. Give the uses of the products in the picture above.
   - Accept responses learners give regarding the uses of the products in the pictures as long as it relates to the everyday use of the product.
2. Suggest other products produced using the knowledge of Chemistry?
   - Also accept any other product they mention whose use applies knowledge of Chemistry
3. What careers require the study and knowledge of Chemistry?
   - Accept all responses referring to careers related to Chemistry

The Meaning of Chemistry

Chemistry deals with the study of materials. In the following activity we shall explore the meaning of Chemistry further.

Activity 1.2: Find out what changes take place to substances in everyday life.

- Tell the learners that, in this activity they will find out what changes take place to substances in everyday life.

1. Burn a piece of paper using a candle or a lighted match. What changes take place to the paper during the burning?
2. Now consider the following processes which take place in everyday life:
   i) The rusting of a kitchen knife
   ii) The boiling of water
   iii) The rotting of fruits

   Describe the changes that take place in each of the processes (i – iii) above.

   What are the necessary conditions for each of the above changes to take place?
3. Name any other processes in which materials change from one form to another?

These changes you have observed and many others show what the study of chemistry is about.

- Tell the learners that, these changes you have observed and many others show what the study of Chemistry is about.
- Ask some learners to explain what Chemistry is in their own words.
- Then harmonise their definition for emphasis.

Hence Chemistry is the study of the matter and the changes that occur to substances under different conditions.

1.2 Why Chemistry is studied and how it overlaps with other subjects

- Let the learners understand that in this section they find out why Chemistry is studied and how it relates to other subjects like biology, physics, agriculture, mathematics, earth and space, etc.
- Allow them to form groups of 5-7 and proceed to do activity 1.2.

Activity 1.3: Discuss reasons for studying Chemistry.

In this activity you will discuss in groups the reasons why Chemistry is studied and how Chemistry overlaps with other subjects.

1. In groups of 5-7, brainstorm on why Chemistry is studied.
2. In your same groups, discuss the relationship between Chemistry and other subjects such as biology, physics, agriculture, geology and mathematics.
3. Prepare your reports and you will present your responses in a plenary.

1.3 The importance of Chemistry and relationship of knowledge of Chemistry to relevant careers

- Now briefly explain the importance of Chemistry and the careers related to chemistry (medicine, agriculture, environment, health, etc.)

Everything is made of chemicals. Many of the changes we observe in the world around we see that caused by chemical reactions. Chemistry is very important because it helps us to know the composition, structure and changes of matter. All the matters are made up of chemistry. In our everyday like various chemical are being used in various from, some of those are being used as food, some of those used clanging etc.

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What are some examples of Chemistry in daily life?

You encounter Chemistry every day, yet might have trouble recognising it, especially if you are asked a part of an assignment! What are some examples of Chemistry I daily life?

Activity 1.3: Find out examples of Chemistry in everyday life.

In groups, using the explanation of what chemistry is, brainstorm on examples of chemistry in daily life. Hint: consider areas such as human and animal medicine, pharmacy, chemical engineering, teaching, etc. and produce a table to present their ideas.

Example	Nature of action
Digestion	Digestion relies on chemical reactions between food and acids and enzymes to break down molecules into nutrients the body can absorb and use.

- Let the learners mention the relevant examples e.g. food industry, chemical industry, climate change, etc.

Examples of Chemistry in the Real World.

There are many examples of Chemistry in daily life, showing how prevalent and important it is.

1. Digestion relies on chemical reactions between food and acids and enzymes to break down molecules into nutrients the body can absorb and use.

2. Soaps and detergents act as emulsifiers to surround the oil grime so it can be washed away from clothing, dishes, and bodies.
3. Drugs work because of Chemistry. The chemical compounds may fit into the binding site for natural chemicals in our body (e.g., block pain receptors) or may attack chemicals found in pathogens, but not human cells (e.g., antibiotics).
4. Cooking is a chemical change that alters food to make it more palatable, kill dangerous micro-organisms, and make it more digestible. The heat for cooking may denature proteins promote chemical reactions between ingredients, sugars, etc.
5. Ask the learners to summarise these given examples in their own note books.

1.4: Contribution of Chemistry to the Economy of Ugandan

Activity 1.4: Research on the contribution of Chemistry to economy.

1. In groups of 5-7, you research on how chemistry contributes to the economy of Uganda.
2. Base your research in the fields of medicines, industries, transport, agriculture
3. Write a short report identifying the areas in chemistry which contribute to the economy of Uganda.
4. If possible, organise learners in groups, to have a field visit and carry out research to explore the common industrial products in our country and relate their uses to the importance of Chemistry. Groups write a report on their research and give a

5. Let the different groups present their discussions and report in a plenary.
6. Observe them as they do the discussions and make a checklist of their participation and responses.
7. Then harmonise how Chemistry contributes to the economy of Uganda from their research and discussions.
8. Let the individuals write reports of visits to show knowledge of the importance of Chemistry to the Ugandan society.

Industry is very limited in Uganda. The most important sectors are the processing of **agricultural** products (such as coffee curing), the manufacture of light consumer goods and textiles, and the production of beverages, electricity, and cement.

Chemistry plays a vital role in feeding growing world population. There are a number of chemicals which help in increasing food production to keep pace with growing population of the world. These chemicals have both negative and positive impacts.

Integration of Situation

As a young Chemistry student, organise a half-day workshop for people in your community to sensitise them on the application of Chemistry in everyday life and its economic contribution to the country.

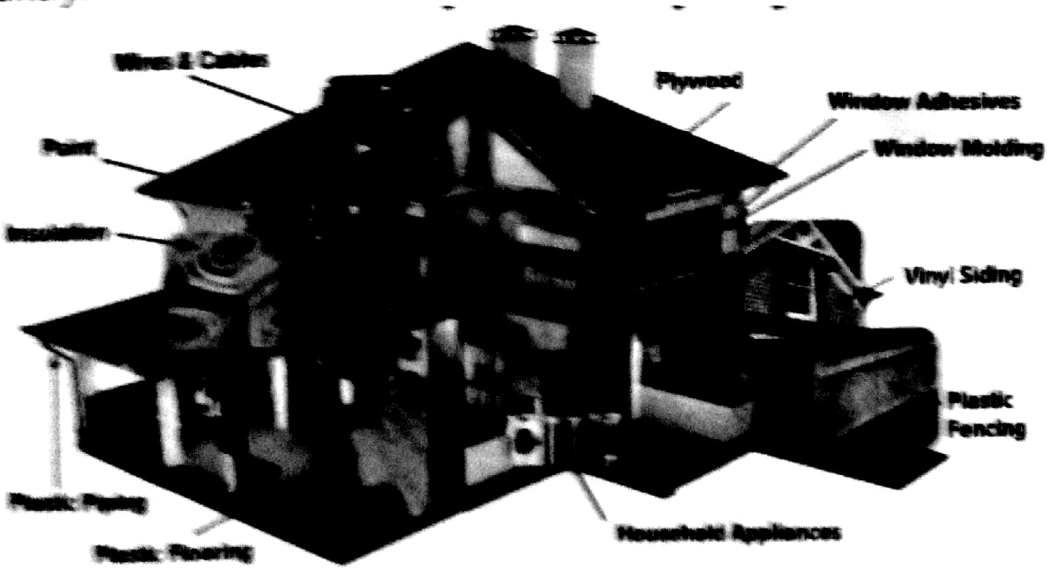

Fig. 1. 2

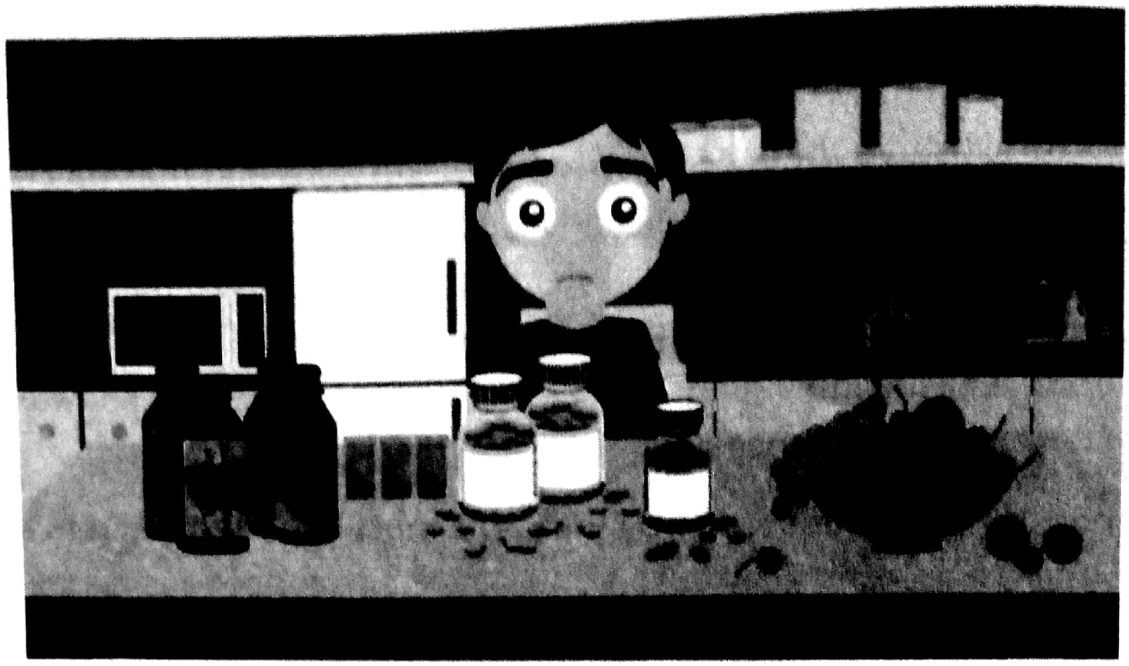

Fig. 1.3

Task:

1 Develop short messages which you will deliver to the people in this community about application of chemistry in everyday life.

2 Develop some messages to illustrate the contribution of chemistry to the economy of the society.

3 How would you ensure the members of the community appreciate the use of chemistry in everyday life?
Hint: use the resources in Fig. 2 and 3 to develop your message.

Assessment Grid

Grades	Relevance	Coherence	Accuracy of the History tools	Originality of the product.
Task 1	A Student will earn a mark if she/he makes an attempt to develop a short message which you will deliver to the people in this community about application of chemistry in everyday life. /1	The learner will earn a mark If the message is coherent and logical. /1	If the student gives an accurate message to the community about the application of chemistry in everyday life, he/she will get a mark /1	An excellent learner who can add additional information (such as anecdotes, external information, drawings, schemas) on the tasks asked.
Task 2	If the learner can develop some messages to illustrate the contribution of chemistry to the economy of the society /1	If the learner attempts to show some explanations to support his/her facts. /1	The learner gets a mark if right arguments about messages to illustrate the contribution of chemistry to the economy of the society accurately /1	
Task 3	Any attempts by a learner to explain how the community can appreciate the use of chemistry in everyday life./1	When there is fair knowledge expressed about the value of how the community can appreciate the use of chemistry in everyday life. He/she will earn a mark./1	The learner gets a mark if accurate explanation of how the community can appreciate the use of chemistry in everyday life. /1	
Total 10	/3	/3	/3	/1

Summary

1. You should know that:
2. Chemistry is a laboratory science: its subject materials and theories are based on experimental observation.
3. common chemicals in pharmaceutics and cosmetics, plastics, food and beverages, soaps and detergents, water treatment, and indigenous chemistry in your local environments are related to chemistry.
4. Chemistry is the study of the matter and the changes that occur to substances under different conditions.
5. the importance of Chemistry in everyday life and the careers linked to the study of Chemistry.
6. Chemistry plays a vital role in feeding growing world population and contributes greatly to the Ugandan economy.

End of Chapter Questions

1 Why Chemistry is called a laboratory science?

2 Physics deals with the relationship between energy and matter, biology deals with living things. What does chemistry deal with?

3 The following are changes that take place in everyday life:

i) The rusting of a kitchen knife

ii) The boiling of water

Describe the changes that take place in each of the processes i) to ii).

4 Why is chemistry important in our everyday life?

5 Identify the areas in chemistry which contribute to the economy of Uganda.