

**LOWER SECONDARY CURRICULUM**  
**Competency Based Chemistry**  
**Scenario items**

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LOWER SECONDARY CHEMISTRY ITEM

Maama Agaba, a popular food vendor in Kikoni zone has been using a new ingredient in her dishes to enhance the food flavor and texture. However, complaints related to stomach issues and allergic reactions have been reported to her from a number of customers. She is considering using an alternative ingredient but needs guidance.

**Task** As a learner of chemistry:

- a) Point out the best alternative product she can use.
- b) Explain the function of the product you have chosen.
- c) Evaluate the impacts associated with long-term use of the product.

LOWER SECONDARY CHEMISTRY ITEM

Umaru wishes to start up a textile industry in order to produce materials to be supplied to the neighboring schools for making corporate wear for the staff members. However, he lacks knowledge on the choice of the best materials that can be used with minimal environmental effects.

**Task** As a learner of chemistry:

(a) Explain

- (i) the category of materials;
- (ii) Suitability of the materials

(b) Advise on the choice of the best materials.

LOWER SECONDARY CHEMISTRY ITEM

A large chemical plant in a rural area is considering producing ammonia to be used in making fertilizers in order to meet the growing demand for fertilizers in the agricultural industry. However, many residents in the area lack knowledge on how the production process can be carried out with less impact to the environment. Your fellow students also wish to understand the same. You have been selected to make a presentation to them by your teacher.

**Task**

As a learner of chemistry, make a write up of the message that you will deliver to them.

LOWER SECONDARY CHEMISTRY ITEM

A copper mine is proposed for development in Karamoja district. However the production process requires large amounts of energy and water which could affect the environment. Additionally, many residents are also wondering how the production process and its benefits can be balanced with minimal effects.

**Task**

As a learner of chemistry, make a useful write up to them

LOWER SECONDARY CHEMISTRY ITEM

With the increasing demand of charcoal and firewood among the residents of Mpigi district, a large part of Mpanga forest was cleared. Consequently, the area started experiencing little rainfall and flooding. This has attracted the attention of the district chairman and thus organized sensitization workshops to address the challenges in the community. Your school has been invited and you have been selected among the speakers with enough knowledge of chemistry knowledge.

**Task**

As a learner of chemistry make a write up of what you expect to be delivered in the meeting.

LOWER SECONDARY CHEMISTRY ITEM

The collapse of Masaka Highway in Busega was attributed to the heavy rainfall that led to flooding, weakening the road foundation. Additionally, the many human activities taking place in the swamp surrounding it such as industrialization and human settlement contributed to its shallowing hence erosion. The environmental experts have embarked on the sensitizing the community with the goal of finding a solution to the current challenges and those likely to occur.

**Task**

As a learner of chemistry, make a write up of your expectations in the meeting.

LOWER SECONDARY CHEMISTRY ITEM

Makula was visiting her grandmother in the village when she developed a body ache. Her grandmother picked some leaves from various plants which she squeezed and gave her. Makula was hesitant at first and insisted on going to a health centre but when she took the liquid concoction, she felt significantly better.

**Tasks**

As a chemistry learner:

- a). Help Makula's grandmother to understand the product she gave to her granddaughter.
- b). Explain to Makula why she felt better after she took the concoction.
- C). Advise Makula and her grandmother about the problems associated with the use of the product.
- d). Help Makula's grandmother understand why her choice was more preferable.

LOWER SECONDARY CHEMISTRY ITEM

James, a young researcher, Investigate gaseous hydro carbons from industrial waste combustion near a petroleum refinery .He analyses a gas X, found to contain 83% carbon and 17% hydrogen by mass, To identify it's molecular structure, He examines its composition. Reactivity and environmental impact, aiming to determine its potential applications and hazards but still remain unable to reach the goal.

**Task.**

As a learner of Chemistry, help James to understand.

- a). Categories of the components found in **X**.
- b).The properties of the gaseous components that makes it useful.
- c). If 2.6g of **X** occupy a volume of 1.12dm<sup>3</sup> at S.T.P.Detemine its molecular formular
- d). Explain the impact of **X** on the environment.

### LOWER SECONDARY CHEMISTRY ITEM

In some districts of Uganda, like Hoima district, farmers experience very low crop yields due to coarse soil, leading to persistent famine in the area. Ammonium sulphate is one of the effective fertilizers used to improve crop yields. The ministry of Agriculture and Animal husbandry has entrusted on investor to establish an ammonium sulphate production plant in Hoima district to provide the fertilizer at a lower cost. The community would like to understand the production process and how it is carried out.

#### **Task.**

As a chemistry student, create a write-up to present to community members.

### LOWER SECONDARY CHEMISTRY ITEM

Urbanization and Industrialization have caused fresh water bodies to suffer from sever pollution.

The Ugandan government aims to create public a awareness regarding the natural resource through various initiatives.

One of the Initiatives is to involve students with good knowledge of chemistry in radio talk show.

#### **Task.**

Write the presentation you can use.

LOWER SECONDARY CHEMISTRY ITEM

Recently, Oil deposits were discovered in albertine region (western Uganda). A Chinese Investor has been contracted by the government to extract the Oil but the people around are scared of the outcomes. You have been invited by the LC 5 chairman of that area to attend one of their meetings, and you are the only person who has some knowledge about natural e resources, so the chairman has requested you to give a talk about the issue.

**Task :** As a chemistry Learner, Make a write up of your speech.

### LOWER SECONDARY CHEMISTRY ITEM

Mamma Jovia has a small-scale business where she sales fruits like tomatoes, yellow bananas among others. Her fruits take a long period of time to ripen and end up making loses on daily basis. She has got some advises from a friend that she can apply Ethene to accelerate the ripening of fruits. However, the lady is concerned about the nature and impacts of the ethene on the health of her customers and the environment. She has called you for a help since you have enough knowledge about the product recommended.

#### Task

As a chemistry learner a) explain

- i) The homologous series to which the product belongs
  - ii) the properties of the product
- b) state other use of the product
- c) Educate her on the impacts of the continuous application of the product on the environment and how it can be solved.

LOWER SECONDARY CHEMISTRY ITEM

Due to increased demand of refined oils like petrol to be used as fuel for running the engines of vehicles and production of plastics in industries. The government has cleared an investor to set up a crude oil purification plant in the area of Moroto. The locals in that area are highly concerned on how the process of production will be conducted, its impact to the environment and how will they benefit from the plant. The chairperson LC 1 has organized a meeting where you have been invited as the specialist from the government to settle the concerns of the locals.

**Task**

As a learner of chemistry, make a short message you deliver during the meeting.

### LOWER SECONDARY CHEMISTRY ITEM

Toyota multinational automotive company is well known in production of car bodies, engines and wheels for vehicles in Jinja city. This has increased a demand for Aluminium since it is used as a material for making the products. This has interested a local investor to set up Aluminium manufacturing plant in Jinja city and he has been granted by the government officials. The residents have failed to agree with the idea of the investor claiming that the plant will highly impact the environment during the production process, how the process will be conducted and whether they will benefit from it. You have been chosen on behalf of the investor to attend the village meeting organized by LC1 chairperson.

#### **Task**

As a learner of chemistry, make a write-up you will deliver during the meeting.

LOWER SECONDARY CHEMISTRY ITEM

Bio gas has become the most favorite source of fuel for many Ugandans replacing traditional fuels like charcoal and fire wood at home. Some people especially elders have negative thoughts about the use of bio gas and have requested the National Environmental Authority (NEMA) through their leader to sensitize the community about the nature, environmental impacts and importance of the bio gas. You have been appointed as the main spokesperson from NEMA to attend a hot meeting organized by the elder leader of the community.

**Task:**

As a chemistry learner write a message you will deliver during the meeting.

LOWER SECONDARY CHEMISTRY ITEM

Irundu village in Namayingo district is a rocky area gifted with some minerals like gold. The locals carry out mining and stony quarrying as their main economic activities. This has captured the attention of the National Environmental Management Authority (NEMA) because the natural resource has been highly exploited. You have been selected as a senior Environmental protection officer from NEMA to educate the villagers about the nature of the natural resource, impacts of exploiting it and its relevance in the environment. You are required to attend the meeting organized by the LC1 chairperson of the area with a theme “**MY ENVIRONMENT MY RESPONSIBILITY**”.

**Task**

As a chemistry learner, make a write-up you will deliver during the meeting.

LOWER SECONDARY CHEMISTRY ITEM

A chemist in Fireworks manufacturing company measured **3600 cm<sup>3</sup>** of a mixture of nitrogen and oxygen gas at room temperature and pressure which they used to explode 4.8 g of magnesium made material to produce the bright sparkling light absorbed in the manufacture of fireworks as in equation below



**Task**

As a chemistry learner,

- (a) Explain the category of the structures formed by solid reactant and product.
- (b) Illustrate how bonding occurs in the solid product.
- (c) Determine the percentage of nitrogen that remained unreacted from the mixture.
- (d) State any **one** chemical process that decreases the composition of the gas used in the production of fireworks

LOWER SECONDARY CHEMISTRY ITEM

A pharmaceutical company dealing with manufacture of medicine from organic compounds had inadequate **non-poisonous solvent** for dissolving the plant extracts. The chemists analysed the solvent used and found out that it had a general formula  $C_nH_{2n+1}OH$  and derived from a given series.

**Task**

As a chemistry student,

(a) Explain

- (i) category of the solvent
- (ii) How do you purify such solvent if it's in contact with other impurities for its continued use?
- (iii) describe the possible dangers associated with continued use of the solvent
- (iv) Guide the company on how to choose the better solvent.

## LOWER SECONDARY CHEMISTRY ITEM

Community members of Odungura village have complained to their LC1 Chairperson about the industry which channels its effluent to open water source and has caused health threat to the community. The chairman has liaised with government agencies in the district to alleviate the challenge. The government has cleared an investor to set up water treatment plant with minimal environmental effect but the villagers need to understand how the process of treatment will take place and possible benefits.

**Task**

As a chemistry learner write a report you will present to the local community.

LOWER SECONDARY CHEMISTRY ITEM

People in Kisinza village only have access to borehole water which is not effective in cleaning clothes when soap is used. A local investor has been cleared by government to set up soapless detergent manufacturing plant with minimal environmental impacts however he is facing resistance from the community members and he is equally lacking knowledge about the manufacturing process.

**Task**

You have been appointed to represent the school in the meeting organized to settle the disputes. Write a message you would deliver in this meeting.

### LOWER SECONDARY CHEMISTRY ITEM

Recently, oil deposits were discovered in Western Uganda. A Chinese investor has been contracted by the government to extract the oil but the people around are scared of the outcomes. You have been invited by the LC Chairman of that area to attend one of their meetings, and you are the only person who has some knowledge about natural resources, so the chairman has requested you to give a talk about the issue.

**Task:**

As a chemistry learner, make a write up of your speech

Urbanization and industrialization have caused freshwater bodies to suffer from severe pollution. The Uganda government aims to create public awareness regarding the natural resource through various initiatives. One of the initiatives is to involve students with good knowledge of chemistry in radio talk shows.

**Task:**

Write the presentation you can use.

LOWER SECONDARY CHEMISTRY ITEM

Moses has just completed building his house in Bulonde, a semi-arid region with limited municipal water supply. He relies heavily on rainwater harvesting and occasional water deliveries. His household includes five family members, and he plans to use the stored water for drinking, cooking, gardening, and emergency backup. He wants a durable, cost-effective tank that suits Bulonde's climate and land space constraints. He has contacted you for advice

**Task**

As a chemistry learner

(a) Explain

(I) the category of the materials

(II) the suitability of the material

( b) Advise him the choice of the material he should go for

LOWER SECONDARY CHEMISTRY ITEM

One of the most important salts in human life is mines from Lake Katwe. The salt is a household chemical compound hence it is given a name common salt. Most of the people in the community have insufficient knowledge on the nature of this salt and importance in their life. One of the community members has identified you as knowledge

**Task**

Guide him on;

- (a) The category of this chemical compound.
- (b) The suitability of the chemical compound.
- (c) How the compound is beneficial to the people in the community

LOWER SECONDARY CHEMISTRY ITEM

Denge village has been hit hard by red eye outbreak. The village is known for its yellow bananas, which are used to make local drink called “Tonto”. But because of the outbreak is getting worse, the ministry of the health has locked down the village. Now, a businessman from nearby town wants to invest in the processing the yellow bananas into a longer lasting product. The villagers are curious and wondering how this will work and how it will affect their community.

You have been invited by the local leaders to sensitize the locals.

**Task**

Prepare a presentation you will make during the meeting.

## LOWER SECONDARY CHEMISTRY ITEM

A parent of a senior four candidate in one of the villages in Kaberamaido District belongs to a “women’s development group”. The members of the group have come up with a project idea of making soap which they think they can sell to the nearby shops and obtain revenue. However, none of the members has knowledge about soap making. But the parent suggested a name of a S.3 candidate to the executive committee of the group as a rescuer and the committee has approached him/her for guidance.

**Task**

As a chemistry learner, Write a brief message that candidate will deliver to the group members.

LOWER SECONDARY CHEMISTRY ITEM

In the village of Nkondo which is on lake shores in Kamuli District, people are found washing near the lake, practicing agriculture and setting up industries. They are now facing a challenge of low water quality. The chairperson of Nkondo village has organized an emergency meeting with a theme:

**“WATER CONSERVATION IS EVERYONE’S RESPONSIBILITY**

**”**

**Task**

As a chemistry learner who is a member of the village make a write up about the theme that you will present in the village meeting upon invitation.

LOWER SECONDARY CHEMISTRY ITEM

During her school holidays, Eva visited her Aunt who works at a stone quarry, she noticed that explosives were being used to blast big rocks to form small stones (aggregates) and there was a lot of dust rising into air. Besides the social benefits, Eva was concerned about what would happen to the site and community if the activity continued overtime.

**Task** As a learner of chemistry, make a write up to respond to Eva's concern.

Following the recent discovery of some of the natural resources in the Albertine region, many people have started encroaching onto the land of this region by clearing trees to create space for settlement and charcoal burning and also the water of Lake Albert is exponentially deteriorating. This has attracted the officials of Hoima district environment management authority. The officials want to sensitize people in the Albertine region about environment conservation through a workshop.

**Task:** As a chemistry learner, prepare a short message you will deliver upon invitation to the workshop.

LOWER SECONDARY CHEMISTRY ITEM

On one Monday evening, Mr. Julius was feeling some joint pains and body weakness. When he went for analysis, it was found that he was infected with malaria. The cost of the drugs was too high and he decided to return home and take some paracetamol which he had got recently for his daughter. For the mean time, he felt some some relief but after two hours of resting, he realized that the pain was just increasing and he has contact you for some assistance and guidance.

**Task:** As a chemistry learner,

- a) Point out the problem Mr. Fred made when choosing the product.
- b) Guide Mr. Fred on how the product works.
- c) Advice he on the challenges associated with the long-term.
- d) Help Mr. Fred evaluate the product.

LOWER SECONDARY CHEMISTRY ITEM

Kadenghe is a small village where majority of its farmers deal in farming to earn a living and get some food. Of recent, the farmers in the village made some losses and they were advised to start applying some nitrogen fertilizers to the soil before cultivation. You have been sent to the agricultural shop and to purchase the best fertilizer which can provide the best yields in the fourth coming season. Some of the samples that are in market are; ammonium sulphate  $((\text{NH}_4)_2\text{SO}_4)$ , ammonium phosphate  $((\text{NH}_4)_3\text{PO}_4)$ , urea  $(\text{CO}(\text{NH}_2)_2)$ .

Use (N=14, P=31 O=16, H=1, C=12, S=32) where necessary

**Task,**

(a) Explain

- i. Category of the product.
- ii. The suitability of the product.

(b) Advise him on the choice of the product he should go for.

(c) Is the product environmental friendly?

LOWER SECONDARY CHEMISTRY ITEM

Mirembe steel mills deals in producing deferent steel beams used to strengthen bridges. The company manager realized that the iron that they have been using to make steel alloys is not pure and he decided to set up his own iron extraction plant to ensure quality products and lower the production costs of making steel. He has appointed a team of engineers to plan and present the project to the Board for approval. You have been called upon to be part of the team of engineers.

**Task:**

Prepare a presentation you will present to your team members and to the board of governors during the meeting.

LOWER SECONDARY CHEMISTRY ITEM

Mr. Magumba has been an engineer in the cement manufacturing company. Of recent, he decided to retire from his job and start up his own projects. However, he is planning to set up a mini cement factory in his village such that he supplies the community with good quality cement at a low cost and also earn some money to run him through his retirement. However the community leaders have opposed his ideas claiming that the project will have more harm than good to the community and it will cause more Environmental effects yet some community members are questioning whether it is going to be beneficial to them and their children. As part of the community, Mr. Magumba has contacted you to support him on what he should deliver to the community in the next meeting.

**Task:** Prepare a report that will guide him on his presentation.

LOWER SECONDARY CHEMISTRY ITEM

Kitumba is a hilly place in Kabale, western Uganda. The youth in Kitumba have for a long time been laying bricks and cutting down trees to burn the clay bricks and sell some as firewood in Mwanjari market. The children in Kitumba are always fishing using small nets and sometimes some poison to maximize more fish from fishing in the small ponds. These human activities have resulted into shortage of fresh water and the agricultural produces yields have lowered with death of livestock. The community leaders have organized a meeting to sensitize the other community members under the theme “MY NEW KITUMBA” and you have been invited.

**Task:** As a chemistry student, make a write up you will display upon invitation.

LOWER SECONDARY CHEMISTRY ITEM

During a grand graduation ceremony in Wakiso district, a popular catering company impressed guests with the mouth-watering aroma and taste of its food. The manager, while handing out business cards, mentioned that the food is always prepared by chefs with a background in chemistry. Some curious guests wanted to know what the manager really meant by that statement.

**Task:**

As a student of chemistry, help the guests understand the role of chemistry in food preparation by addressing the following:

- (a) The variety of the ingredients used.
- (b) The suitability of the ingredients.
- (c) The health-related concerns that may arise from these ingredients.
- (d) The advice on choosing the right kind of ingredients used.

LOWER SECONDARY CHEMISTRY ITEM

A youth's cooperative in Mbarara town is planning to expand its fruit juice business. As part of their business growth, they need to purchase packaging bottles that are of high quality and environmentally friendly. The manager, aware of your chemistry knowledge, has requested your guidance in making an informed choice of material.

**Task:**

As a chemistry student, help the manager on the;

- a) (i) Category of the materials to use.
- (ii) Suitability of this material for packaging fruit juice.
- a) Give another purpose for which the materials can be used
- b) Advise the manager on the side effects of using the materials and how to avoid them

## LOWER SECONDARY CHEMISTRY ITEM

The National Agricultural Research Organization (NARO) has reported a shortage of nitrogen based fertilizers in the country. To boost agricultural productivity and soil fertility, the government has contracted an investor to establish a fertilizer manufacturing plant in Kagadi town. However, the investor is uncertain about the scientific process involved in producing the fertilizer and the possible effects the plant may have on the environment.

**Task:**

As a chemistry student, prepare a write-up to the investor to clear his doubts.

### LOWER SECONDARY CHEMISTRY ITEM

There has been growing concern across the country about the rising cost of fuel—petrol, diesel, and paraffin included. In response, the government has partnered with foreign investors to establish a new oil refinery plant in Kyakayege village, Sembabule District, to make use of the local oil deposits. However, some residents are protesting the move, fearing land grabbing and questioning the importance of the refinery to their community. They also lack knowledge about how the oil refining process is carried out.

To address these concerns, the District Development Officer (DDO) and the Local Council Representative have organized a radio talk show on a local station to help sensitize the public.

#### **Task:**

As a learner of Chemistry, prepare a write-up you would make upon invitation.

### LOWER SECONDARY CHEMISTRY ITEM

Kisoro, a scenic village nestled among the rocky hills of southwestern Uganda, has relied heavily on stone quarrying as a major source of income. The region's rich stone deposits have provided many residents with work through the extraction and sale of stone.

However, continued quarrying has resulted in serious environmental concerns, including seasonal weather changes, water shortages, poor air quality, health risks, and water contamination.

In response, the government has launched community awareness programs to help address these challenges and educate residents about the impact of quarrying.

**Task:**

As a chemistry learner, prepare a simple write-up that the government should base on when addressing the residents.

LOWER SECONDARY CHEMISTRY ITEM

**Nyakibale village** in Rukungiri District is rapidly growing. Areas that were once covered with wetlands and natural vegetation have now been replaced with houses and business structures. Sand mining and brick-making have become the major economic activities in the area.

Recently, most of the water wells have dried up, and the remaining water sources are polluted. Residents who practice small-scale farming also report irregular weather patterns, leading to poor harvests and increased food scarcity. These changes have raised serious concerns among the local community. In response, the **National Environment Management Authority (NEMA)** plans to conduct a sensitization workshop to raise awareness about the environmental issues affecting the area.

**Task:**

As a chemistry learner, prepare a brief presentation you will deliver upon invitation.

LOWER SECONDARY CHEMISTRY ITEM

On a school break, Nakato visited her aunt in a hilly rural area where she helped with laundry chores. She noticed that the washing agent her aunt used produced very little lather, and a greyish layer formed on the clothes and in the water. Later, back at school in the city, Nakato used a different cleaning agent that foamed easily, and no layer was left behind. Curious about the difference, she decided to compare the two products in her chemistry journal.

**Task:**

**As a chemistry learner:**

- a) Categorize the products used from the each location.
- b) Describe how the product used at school performs its cleaning function.
- c) Give the side effect associated with the school product and explain how its impact can be mitigated.
- d) Evaluate the two products by stating one similarity and one difference between them.