

**S.4 CHEMISTRY SCENARIO COLLECTIONS 2026**

Note; Thanks very much for trusting Ngambo Wilson' s resources from the start to the End, kindly be informed that this set of chemistry collections is a NEWLY modified edition of the 2025 collections. Most items here have been modified and more items have been added. Solutions for all items are available at Ugsh. 7000.

Just call or watsapp 0758077371 / 0779806613.

**1.** The production of cement has enabled progressive urbanization from local soil-built houses to cemented brick houses. And so, cement is an important chemical in most societies. You were part of the chemistry class that visited one of the factories and the process of production was explained to the class.



You have been invited to a radio talk show to explain how cement is produced, after your presentation, Ngambo, one of the callers wants to know if there are any impacts associated with the process you have talked about.

**Task:** As a learner of chemistry;

- a) Make a write up of the sensitization message to the end of the radio talk show.
- b) Identify the social benefits of manufacturing lime and cement to the society.
- c) Explain some of the dangers to the community arising from the manufacture of lime and cement.
- d) Ngambo, a villager from Moroto has been identified as one of the victims of the above dangers in (c), as a chemistry learner, advise Ngambo on the steps he may take to minimize the dangers arising from the manufacture of cement.

**2.** On Peter's graduation party that was organized in Kasese District, western Uganda last month, you and other guests were invited. However you got excited by the aroma and taste of the food served before you. The preliminary report from the Head catering service provider shows that they used some of the ingredients like Onions, table salt, garlicks, Carrots, tomatoes, turmeric, gingers, and cooking oil.

However, the Master of ceremony (MC) reminded the guests that the food was prepared with the knowledge of chemistry, but still some of the guests didn't understand what the MC meant. You have been asked to give guidance.



**Task:** As a chemistry student;

- Identify the category of the ingredients used.
- Explain the suitability of the ingredients used that make them useful during food preparation.
- Explain some of the danger(s) arising from the long – term use of the products with mitigation.

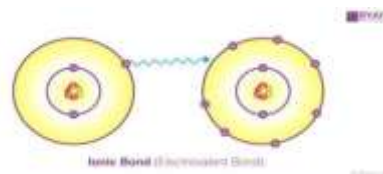
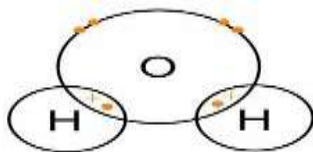
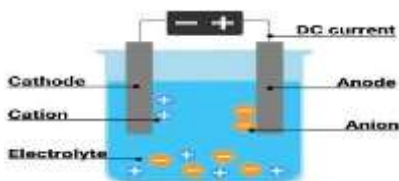
**3.** Mzee Senke, a renowned 78 years old herbalist. He is known for his treatment usually from the mixing of a variety of plant parts such as lemon peels, garlic bulbs, gingers and raw honey by getting their extracts, that he uses for treating his trusted patients with digestive related bacterial infections and fungal infection among others. However, lately some of his patients he treated didn't fully recover from the diseases instead their health conditions worsened than before and they were admitted in the hospital for proper medication. You have been asked to give guidance.

**Task:** As a chemistry student:

- Identify the mistake they made while choosing the products.
- Help them understand how the product(s) works.
- Suggest the possible side effect(s) of the product to the users and mitigate.
- Evaluate the products.

**4.** Sugar and sodium chloride are common compound used by MR. Bakaki to serve different functions at home. Bakaki's son accidentally poured a solution of sodium chloride into a laptop which immediately blew up.

The boy also became surprised when he heated sugar and it ended up melting so fast with gentle heating. The boy got puzzled about the properties that determine the uses of each compound.



### Tasks.

- As a chemist, explain what happened causing the laptop to blow.
  - Suggest any two other properties of the type of compounds to which the compound that melted easily belongs?
  - Using the outermost shell electrons only, show how the compound that caused the laptop to blow up is formed.
- 5.** Due to increased demand for the construction of strong and modern houses, iron bars are used but are few in supply. To ensure the availability of iron bars, the government is considering setting up an iron production plant in a certain area. However, the residents of the area need to be sensitized about the industrial process, social benefits, side effects and how they can be overcome.

Your head teacher has been identified to sensitize the residents but has no knowledge about the matter.

**TASK:** As a learner of chemistry, prepare a write up that your head teacher will use to sensitize the residents.

- 6.** Edward lives along the channels of a water body which supplies the entire village of Masajja with water. He has many cows which drink and move with in the water body. He has a big plantation of crops next to the water body on which he uses a massive amount of fertilizers to ensure that he gets high yields.

He normally cools his machine in water and his sister earns a living by washing clothes daily for people in masajja. The sister uses detergents and soap to wash the clothes.

The particles of Edward's family have raised concern in the community. The area chairperson has organized a meeting to create awareness for Edward, his family and the community.

**TASK:** As a learner of chemistry, make a write up of the message the chairperson will present to the community.

**7.** Natural resources especially rocks, hills and mountains have been destroyed as a result of increasing population and human activities. This has attracted the attention of the officials from the National Environment Management Authority (NEMA).

The officials are planning to create awareness to the people of the country through sensitization workshops organized in different communities.

**TASK:** As a learner of chemistry, make a write up of the presentation the NEMA officials would deliver during the sensitization workshop.

**8.** In one of the societies in Kampala, there is an outbreak of bacterial diseases such as typhoid. The society members rely on each other for medical advice. Recently, a resident complained about persistent stomach ache followed by diarrhoea, but there was no one to advise on proper medication the society members should use.

**Task:** As a learner of chemistry;

- a) Advise society members on the possible types of products to use?
- b) Carefully educate them on what the products exactly do.
- c) Advise them on the challenges associated with the product use and consequently how to select the products to use

**9.** Science club members of Kyadondo SS were investigating the reaction of period 3 elements with water.

Ngambo, a member of the club first considered two elements X and Y and the following observations were obtained for the reaction with water.

**A**

Observations; Reacted vigorously while floating on surface of cold water forming an alkaline solution with evolution of hydrogen gas.

**B**

Observation; Reacted slowly with cold water forming alkaline solution and hydrogen gas but when heated with steam, forming a white solid and hydrogen gas

**TASK:** As a learner of chemistry;

- (a) State the category of elements X and Y.
- (b) Predict the reaction of the other elements in period 3 with water.
- (c) Advise Ngambo about the dangers associated with the reaction of these elements with water.

(d) Help the science club members identify elements X and Y.

**10.** Due to increasing demand of power in Uganda, the government wants to adopt use of nuclear power.

However, there is little knowledge among the natives about how nuclear energy works. The ministry of energy and mineral development is interested in a knowledgeable person to sensitize the natives about the matter.

**Task; As a chemistry learner,**

- advise the natives on the types of processes that can be used by the government.
- educate them on how the energy can be produced and **caution** them on the possible dangers associated with the process.
- suggest to the residents on the most efficient process.

**11.** Mudhiba, a senior one student who had just been admitted to school landed on a piece of paper that had a drawing as shown below.

	<b>II.</b>			<b>VII</b>	
<b>A</b>				<b>B</b>	
	<b>C</b>				
					<b>D</b>
<b>E</b>					<b>F</b>

*Table 5.4*

Mudhiba was puzzled on what the drawing represented and what the letters A, B, C, D, E, and F were representing.

- As a student who has studied senior two chemistry,
  - Assist the Mudhiba to know the nature of elements A, E and C. Give a reason for your answer.
  - Advise the Mudhiba on how to call elements D and F and give him the trend in their reactivity.
- Assist the Mudhiba to know the conditions required for elements E and C to react with water.
  - Element E: .....
  - Element C: .....

c) Suggest one use of an element in the same category like elements D and F so that the he can appreciate the importance of chemistry in society.

**12.** In one of the towns in Uganda, residents are facing an unexpected challenge of water wasting soap. The locals are frustrated; do not understand the cause and what to do. However, they have heard of other detergents on market that work better but they need more advice on this.



A resident has sought your assistance and confidence that you can use your Knowledge of chemistry to provide help

**TASK:** Write down the advice you would give the resident.

**13.** Many people in villages make a living by manufacturing local waragi (ethanol). However, the government is against the business due to associated challenges. The district's LC5 chairperson wants to sensitize the community about the large-scale production process and its impact to enable them understands the government position.



The district's LC5 chairperson has contacted you as a student with the knowledge of chemistry in your village to provide the relevant information.

**TASK. Make a write up to use upon meeting the community.**

**14.** A shop attendant wants to use environmentally friendly and sustainable packing materials. He is not having enough information about which packaging materials to use.



He has decided to seek for advice from a person with good knowledge of chemistry.

### TASK

- help him appreciate that the packing materials are of different types
- advise him on the suitability of the materials

**15.** A group of Learners were faced with a unique solid substance, X, which they suspected to be an element. **0.3g** of the element could burn in air to form **0.5g** of the solid product. One of them picked interest in what could be the chemical formula of the oxide of the element. However, he did not know how to determine the formula. When they contacted the laboratory technician he gave them the atomic number and mass number of X as **12** and **24** respectively, and the symbolic representation of oxygen as  ${}^{16}_{8}\text{O}$

**Task;** As a student of chemistry help the learners to;

- understand the nature of substance X
- determine the formula of the oxide of X
- know the environmental consequences of the element

**16.** A community project in a rural area needs to roof a school building with a limited budget. However, on enquiry from the structural engineer for what type of roofing sheets would be most cost effective while offering basic protection, engineer James advised them to buy galvanized Iron sheets. On hearing the word iron, mzee Popi, the chairman of the project started thinking of words like iron nails, iron bars and believed all these are made from the same material iron. He is now concerned of the material is manufactured. Your DOS has been identified to sensitize the chairman but has no knowledge about the matter.



**Task;** As a learner of Chemistry, prepare a write-up that your DOS will use to sensitize the chairman.

**17.** Tadeo owns a laundry shop in owino market in Kampala town but Tadeo is so stressed about the few profits he gets from the soap he sells and now has developed an idea of setting up his own soap manufacturing plant so as to maximize profits from the soap sales and to ensure efficient supply of soap. Tadeo has a small piece of land in Hoima and that's where he wants to start up the project but he lacks knowledge about the production process of the soap; some of the challenges he may encounter and benefits he may obtain from the process.

You have been identified to sensitize Tadeo on the matter,

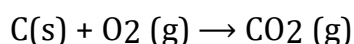
**Task;** As a Chemistry learner, make a write up you will use during the sensitization.

**18.** Luwero, one of the most sparsely populated districts in Uganda is well known for being a charcoal production hub. Most of the youths residing in Luwero are involved in cutting down trees, burning the wood and the final products used and the rest exported to other regions. The residents are thereby frustrated with the toxic fumes from the activities. The air, water and the soil has always changed over time in Luwero district. This has however attracted the attention of the officials from the National Environment Management Authority (NEMA). The officials are planning to create awareness to the people of Luwero and the country through sensitization workshops organized in Luwero district and the different districts.

You have been approached to guide the officials on what to present.

**Task;** As a learner of Chemistry, prepare a write-up the NEMA officials will use during the work shop.

**19.** Charcoal is a common fuel used in many homes in Uganda. During its combustion in excess oxygen supply, it produces carbon dioxide. Your friend is using **80.5g** of charcoal to cook food in a busy evening for guests. It burns completely as shown in the equation below.



**Task;** As a learner of chemistry

- Assess the product formed
- Advise the friend on the appropriateness of the product formed.
- Calculate the volume of the gas produced every busy evening. (1 mole of a gas occupies 22.4l at s.t.p, C = 12)
- Help the friend understand the impact of the product in the environment

**20.** Ngambo often gets stomach pain every time he eats potato chips flavored with tomatoes. On enquiry, his doctor tells him it's due to too much of substance Q in his stomach and recommends him taking an antacid.

**Task;** As a learner of Chemistry, help Ngambo to;

- i) Identify the category of substance Q.
- ii) Understand why an antacid helps with stomach discomfort.

**21.** In a S.2 class, a Chemistry teacher explained to learners that every time ice gets on the roads in Canada during winter, Rock salt is spread on the roads making it to run off into nearby rivers thereby leaving the roads ice free. But the learners were left confused of what Rock salt is and therefore needs advice.

**Task;** As a learner of Chemistry, help

- i) Explain to the learners the chemical elements present in the rock salt and write the formula of their ions.
- ii) Describe one possible effect of increased salt concentration on aquatic life, ( 02 scores) iii) Suggest one alternative method (other than salt) for keeping roads ice free and discuss its advantages and disadvantages.

**22.** Kimuli prefers cooking using natural gas as he believes it facilitates faster food preparation. One time as Kimuli was cooking his meal, the burner lit off and couldn't light again. He wondered how this could happen and invited his friend to clearly explain to him what could have caused that. However his friend explained to him that the gas in the cylinder was over and advised him to visit the nearest Total Petrol station for a refill. You have been contacted for help.

**Task;** As a learner of Chemistry'

- a) Explain to Kimuli the category of the gas product used.
- b) Suggest the properties of the gaseous product that makes it useful in daily life.
- c) If the gaseous product used contains 73.4% of element carbon and the rest being Hydrogen. Determine the molecular formula of the gaseous product if the molecular mass of the gaseous product is 16.

Identify the gaseous the gaseous product used.

**23.** A businessman was selling salt mixed with particles of sand, tricking people who couldn't notice the difference between the salt and its mixture with sand. This made it difficult for residents to use the salt. They need your help to prevent future problems and avoid any chemical dangers



They trust your chemistry knowledge to clarify the situation and prevent further suffering.

**Task.** Help the residents;

- (a) Know the behavior of the substances in the mixture.
- (b) Evaluate the problems associated with the use of one of the component in the mixture

**24.** A new knitting firm in Entebbe Uganda makes sweaters from cotton. However, clients are complaining that these are easily decomposed by moths and carpet beetles. The operations manager has heard of nylon as an alternative material. She is uncertain of its nature, composition and effect on the natural well-being of the community. She has contacted you as someone with knowledge of chemistry to guide her in making a better choice.



**Tasks;**

- (a) Guide the manager on
  - (i) The category of the selected alternative material
  - (ii) The characteristics of the material
- (b) He is inquisitive about its use. Advise her
- (c) „Will the selected alternative have an effect on natural well-being of the community?“ If YES, What can be done?

**25.** Uganda electrical engineers“ forum has raised a concern of reduced copper wires in the country. In response, the government has contracted an investor to set up a new

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copper extraction plant in Kasese, a copper ore rich district. Unfortunately the investor has some doubts on his scientific knowledge on the production process and the likely impact on the environment.

#### Task;

As a chemistry student, write a message to the investor to settle his doubts before his final interaction with residents.

**26.** The ladies in Kigulu women's group in Iganga district have given up on using soap in their homesteads due to its price fluctuation in the region. The chairperson of the group has a suggestion of processing liquid soap as an alternative since it's cheaper. However she has some doubts whether it's a better choice and its impact to their ecosystem.



#### Task;

She has approached you as a chemistry student settles her doubts. Write a message to guide her in her presentation in the forthcoming group meeting.

**27.** Rushekye hills in Kisoro district Uganda are found to contain significant iron deposits. An investor wants to set up an iron and steel rolling factory to tap into the opportunity. The local leaders are debating about the project. However, they seem not to understand how iron can be obtained from its raw materials and consequently its benefits.



As a SENIOR FOUR candidate with the knowledge of chemistry, the residents are confident that you can provide the necessary information.

**TASK;** Prepare a presentation which you will use upon invitation.

**28.** James, living in an area where they use bore hole water, slid, fell and his white shirt became dirty. He decided to use a detergent to clean his shirt. The shirt remained with some brown spots yet he had rinsed it several times.

**Task:** As a chemistry learner;

- (a) Point out the problem James made when choosing a product.
- (b) Help James understand how the product works.
- (c) Advice James on the challenges associated with the long term use of the product.

**29.** Ngambo is in the process of constructing his house without affecting the environment. He wants to build a good strong house; there are various building materials of different quality and properties on the market. However, he does not know the quality of materials to use. Ngambo knows that choosing quality materials depends on the nature of the material and has come to you for advice.



**Task:** Use your chemistry knowledge to;

- (a) Explain (i) Categories of materials.  
(ii) The suitability of the materials.
- (b) Advise Ngambo on the choice of materials.

**30.** One of the large scale uses of chlorine is treating water, to ensure that chlorine is readily available and at a cheaper cost. Government has cleared a local investor to set up a chlorine production plant near Lake Katwe in Kasese district. However, the community is concerned about its environmental effects and how the environmental process will occur. The class teacher has appointed you to sensitize the other learners.

**Task:** Prepare a presentation you will make during the meeting.

**31.** Air which is a mixture of different components contains 21% oxygen. Due to a wide spread of respiratory illnesses caused by COVID-19, there was an increased demand for oxygen by patients in hospitals. The government supply of oxygen is not enough and is planning to set up an oxygen production plant with minimal environmental impact.

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However, the science club members in your school would like to know how the process of production will be carried out.



**Task:** As chemistry student, make a write up you will use during the presentation.

- 32.** Natural resources have been destroyed as a result of increasing population and human activities. This has attracted the attention of the officials from the National Environment Management Authority (**NEMA**). The officials are planning to create awareness to the people of the country through sensitization workshops organized in different district communities.



**Task:** As a chemistry student, prepare a short presentation you will deliver during the workshop upon invitation.

- 33.** Osukuru village in Tororo district is at the foot of Tororo rock. People of this village for a long time have practiced charcoal burning, animal husbandry, crop husbandry and stone quarrying, recently the animals have started dying and wells are drying up yet the little water available is not fresh. The locals are now wondering why all these are happening. A sensitization workshop is to be organized to explain the existing situation in the village. The theme of the work shop is

**“MY ENVIRONMENT MY RESPONSIBILITY.”**



**Task:** As chemistry student, write a message you will deliver upon invitation

**34.** In Kabarole district most of the citizens survive on farming that involves growing of crops every season. For the last three seasons, farmers are registering a great decrease in the amount of the harvest they are making. The government has cleared a local investor to startup a fertilizer production plant in the district. However, the citizens are very much worried about the effects of the plant to the environment.

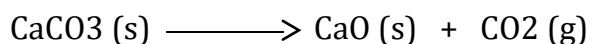
**Task;** The chairperson LC5 of the district has appointed you to sensitize the citizens of the area.

**35.** During the Second World War the cities of Hiroshima and Nagasaki in Japan were bombed using the most lethal weapon of the time, which caused massive destruction. However, the energy that was used can be useful in the treatment of cancerous growths in humans. Up to now the impact of the bombing is still being felt in Japan.

**Task:** As a learner of Chemistry;

- Identify the type of bomb used
- Suggest any other use of the form of energy that was used in the bomb.
- Explain the other danger associated with the form of energy in the bomb and give its mitigation.

**36.** An industry wanted to produce lime for treatment of acidic soils. The production of lime involves heating limestone strongly which results into its decomposition according to the equation;



The industry is also interested to know how much gas is evolved during the process since the gas is useful. Before the production, an experiment was performed where 25g of limestone were heated until there was no further change. You have been contacted for help,

**Task:** As a learner of chemistry;

- Explain the categories of the products
- Suggest the properties of the gaseous product that make it useful in daily life
- Calculate the volume of the gaseous product measured at s.t.p. that was formed.
- explain the impact of one the products above on Environment.

**37.** In Uganda, copper wires are used mainly for transmitting electric power. To ensure the availability of wires, the government is considering setting up a copper production plant in a certain area. However, the residents of the area need to be sensitized about the industrial processes, social benefits, side effects and how they can be overcome.

Your head teacher has been identified to sensitize the residents.

**Task:**

As a learner of Chemistry, prepare a write-up that your head teacher will use to sensitize the residents.

**38.** 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 an s.4 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.

**39.** Peter, the cattle keeper, grazes his cattle on a community land. During the dry season, he practices bush burning and also takes his cattle to drink water from the community water source. Peter’s practices have raised concern in the community. The area chairperson has organized a meeting to create awareness for Peter and the community.

**Task:**

As a learner of Chemistry ; make a write-up of the message the chairperson will present to the community.

**40.** 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 the air as shown in figures 3 and 4

**Fig. 3**



**Fig. 4**



<https://www.google.com/url>

Besides the social benefits, Eva was concerned about what would happen to the site and community if the activity continued over time.

**Task:**

As a learner of Chemistry, make a write-up to respond to Eva's concern.

**41.** Cook Musa left knife outside the compound for a winter night, it was found that the knife turned dark brown on the surface the following day.

a) What is the chemical name for the dark brown coating?

b) What conditions led to the formation of the dark brown coating?

c) State any two advantages of the above process to the economy

**42.** 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 an industry that makes soapless detergents in the area however he is facing resistance from the community members about the issue of starting up the factory and he is equally lacking knowledge about the manufacturing process.

The head teacher has appointed you to go and represent the school in the meeting organized by the chairperson of the area to settle the wrangles between the investor and the citizens of the area.

**TASK;** Write a message you would deliver in this meeting.

**43.** a) Use the particles theory of matter and explain the following observations

i) An inflated balloon expands and eventually bursts on leaving it exposed to sunshine

ii) An inflated balloon eventually sinks when left on a cemented floor for 3 days

iii) You can easily squeeze a plastic gas syringe that is completely filled with air, than squeezing the one which is filled with water

iv) When tea bag is put in a cup of hot water, colorless water changes to dark brown

b) Explain why the rain water is always slightly acidic.

**44.** The human stomach contains hydrochloric acid with a pH of about 2. The acid helps to kill any germs in our stomach. However, when the stomach walls produce too much of the acid, we suffer from stomach pains and heartburn. One way to deal with this problem is to take an antacid. The main component of antacid is sodium hydrogen carbonate.

a). Explain how the antacid helps to cure heart burn..

**45.** In Nakasongola, people make charcoal from burning wood. Jimmy has just migrated to Nakasongola and wants to make charcoal from wood like the rest of his neighbours. He piled pieces of wood, introduced fire underneath and left them to burn overnight. In the morning, he found a heap of ash with very little pieces of charcoal, not strong enough like what his neighbours make.

**Task;** As a friend to Jimmy who understands the process of charcoal making, write a letter to advise him on how to make charcoal.

**46.** Students were asked to identify examples of the changes that can take place in the atmosphere but use the same components of air. One student mentioned the burning of magnesium in air and the rusting of iron.

(a) What component(s) of air are used during burning of magnesium and rusting of iron?

(b) What is the similarity between the two chemical changes?

(c) What makes rusting of iron different from burning of magnesium in air in terms of conditions for the reaction?

(d) Write the formulae of the products of each of the changes.

**47.** A student dropped a few pieces of marble in dilute hydrochloric acid contained in a test tube. The gas produced was passed through calcium hydroxide solution (lime water) for a long time.

(a) What changes would be observed in limewater?

(b) Write balanced chemical equations for the changes observed.

**48.** Food cooked without common salt is tasteless. Only those suffering from hypertension (high blood pressure) and associated illnesses are advised to eat food without salt. This is because the ions of the chemical elements in salt can worsen their health conditions.

(a) Identify the chemical elements present in common salt and write the formula of their ions.

(b) Explain what the presence of ions in sodium chloride indicates about its bonding and formation.

**49.** A group of students went for field study in one of the largest limestone quarries in Tororo, Eastern Uganda. Limestone is used in the production of cement. (a) Write the formula of the main compound in limestone used for cement manufacture.

(b) Describe the major steps involved in making cement from limestone.

**50.** In Uganda, there are many industries that manufacture soaps and detergents. Some of the common detergent brands include OMO, ARIEL, NOMI and VIM. Explain why you would prefer to use powdered detergents such as those mentioned above to bar soap?

**51.** A group of students found out that different metals react differently. They observed this when some metals were made to react with cold water and steam. The changes they observed are summarized in the table below.

<b>Metal</b>	<b>Reaction with water</b>	<b>Reaction with steam</b>
Sodium	Reacts rapidly	Reacts violently
Calcium	Slow reaction	Fast reaction
Copper	No reaction	No reaction
Magnesium	Very slowly	Relatively fast
Iron	Too slow	Slow

- (a) Use the information in the table to arrange the given metals starting with the most reactive to the least reactive.
- (b) Explain if calcium could be suitable for making roofing sheets.
- (c) Which of the metals would be most suitable for use in making water pipes?

**52.** A juice vendor makes juice by mixing passion fruit, water and sugar. The vendor separates the passion fruit seeds from the mixtures and adds sugar to make it sweet.

- a) Name the process by which passion fruit seeds are separated from the mixture
- b) Explain why it is possible to separate passion fruit juice by the process named.
- c) What do you expect to have happened to the sugar crystals when added to the fruit juice?

**53.** A carpenter was contracted to fix a door lock for a new house. He went to a hardware shop but found different metal types of locks with handles made from iron, brass, zinc and copper. However, the carpenter opted to use locks made of brass out of the different types.

(a) What is the composition of brass?

(b) Explain why the carpenter preferred to use brass to the other metal materials available in the hardware?

54. The table below shows the melting point, boiling points and densities of substances A to D.

substance	Melting point(°C)	Boiling point(°C)	Density (g/cm <sup>3</sup> )
A	1110	2606	9.1
B	-266	-252	0.07
C	60	120	1.6
D	-14	60	0.9

State with reasons which substances are;

a) Gas at room temperature

b) Liquid at room temperature

c) Solids at room temperature

(d) Comment on the relationship between melting point and density of the of the substances

55. 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.

56. "Residents of Kampala are facing severe health risks due to poor air quality," was a headline in one of the recent editions of the New Vision newspaper. With the city's reputation tarnished and residents' health hanging in the balance, urgent action to raise

awareness and clean the natural resource is needed, the paper continued to state.

The Kampala Capital City Authority (KCCA) is getting ready to improve the situation following the alarming revelation.

As a student of Chemistry who has learned about air as a natural resources

### TASK

Write an article KCCA would use in response to the paper to sensitize the community of Kampala.

57. Large deposits of oil have been discovered in Lake Albert and near Hoima city. Crude Oil contains a variety of different compounds but with similar structure. The simplest of these compounds is methane of  $\text{CH}_4$ . The amount of energy released by the complete combustion of 1 mole of methane is 890.7 KJ/mole

- a) Identify and write the general formula of the organic family to which the components of oil belong.
- b) Name and write structural formula of the next three members of the organic family after methane
- c) Petrol is another product of oil used as fuel but burns more slowly when samples of some lead compounds are added to it. Draw sketch curves on same graph, of amount petrol burnt against time to represent the burning rates of unleaded and leaded petrol.
  - (d) (i) What mass of methane in grams would be needed to heat 1 (one) litre of water from  $25^\circ\text{C}$  to  $60^\circ\text{C}$  (Specific heat capacity of water =  $4.2 \text{ Joules/g/K}$ , density of  $1 \text{ g/cm}^3$ )
  - (ii) If ethanol was used instead of methane to heat the same amount water, what mass of ethanol would be needed? (Enthalpy of ethanol =  $-1366.8 \text{ KJ/mole}$ )
  - (iii) Which one between one between ethanol or methane is a more effective fuel and why?

58. Students were asked to develop a project that would result into repair of cracked pathway. The practical report developed by the students had the following set of instructions for making concrete: To make good, strong concrete, thoroughly mix together 4 buckets of gravel, 3 buckets of sand and one bucket of cement.

When this is done then adds a half bucket of water.

- a) State one property of concrete that make it suitable for its uses.

b) Copy and complete the table below showing the percentage of each ingredient in the concrete mixture. (Give your answer to the nearest whole number)

Ingredient	cement	water	sand	Gravel
Number of buckets				
Percentage				

c) Describe an investigation that could be performed to determine what particular mixture of gravel, sand and cement makes the strongest concrete.

d) What would be varied, what would be kept the same to test the strength of the concrete and explain the effect?

59. Uganda's forests are under pressure from illegal logging, agricultural expansion, and urban growth. Despite government attempts to advocate for sustainable forest management, these efforts have failed due to citizens' lack of awareness regarding the benefits and consequences.



Use your chemistry knowledge to create awareness on the matter.

**TASK.;** Make a write-up you can use upon meeting the citizens.

60. In Uganda, people are voicing concerns about prolonged drought and unpredictable rain seasons, leading to difficulties in farming planning. The officer in charge of agriculture attributes these issues to the overuse of charcoal and kerosene for cooking, citing their environmental implications. However, many natives seem to struggle to grasp the connection between their energy consumption habits and the broader environmental impact.



You are expected to close a gap in understanding between the officer's perspective and the community's perception of the situation

**TASK;** Help the natives understand this connection better.

**61.**The figure below shows a sample of a metamorphic rock obtained from Kilembe mines.



- a) Name two observable features of the rock sample.
- b) The sample was analyzed and found to contain 51.6% copper, 9.7% carbon and the rest oxygen.
- i) Calculate the percentage composition of Oxygen in the rock sample.
- ii) What is the empirical formula of the copper compound in the rock sample?
- (Cu=64, C=12, O=16) iii) If the molecular mass of the copper compound from the rock sample is 124, what is its molecular formula?
- c) 6.2g of the copper compound in (b) above was heated strongly to constant mass.
- i) Write equation for the change that took place during heating.
- ii) Calculate the volume of the gaseous product formed at stp.  
( molar gas volume= 22.4dm<sup>3</sup> at stp)
- iii) Calculate the change in mass of the copper compound.

**62.**Mr Lukas and his family, being new in Moroto town areas, resorted in buying borehole water from one of the local water suppliers for laundry work. While his wife was washing, she noticed that despite several rinsing of the water with the detergent, the less the volume of lather formed and later, several lines of brown stain were formed on the white cloth she hanged on a wire. This left her stressed with what was really wrong with the water. You have been approached to give advice.

**Task:** As a chemistry student;

- a) Identify the mistake she made while choosing the product.
- b) Guide his wife on how the product works.

c) Advise them on the change that may come from the long-term use of the detergents.

**63.** In the Village of Mazuba, people are involved in certain activities which lower the quality of water unknowingly and these include; washing near water bodies, Agriculture near Water bodies and setting industries.



**TASK.** As a learner of chemistry, use the knowledge of water acquired to explain to the people of this village to overcome the problem of lowering the quality of water.

**64.** Mr Baguma, a laundry worker in one of the busy towns in Kampala suburbs, has doubts about the effectiveness of the surfactants X and Y he just bought with the aim to do his daily laundry work. His customers on their white clothes complain of stains, despite his several attempt to rinse surfactant X with water, compared to when he used surfactant Y. This left him confused, and has come to you for guidance.

**Task:** As a chemistry student;

- a) Identify the category of the products used.
- b) Explain how the products works.
- c) Point out some of the danger(s) arising while using the products.
- d) Help him to evaluate the products.

**65.** The Kampala capital city authority, KCCA, in their financial budget. They intend to construct recycling plant for plastic wastes in Kitezi landfills with the intention to generate hydroelectric power and also to prevent the drastic leakages of the plastic wastes into the environment, following the advice from the technical team about the uniqueness of the structural properties of these materials used. However, the community members have perceived this initiative with skepticism due to some bad influence from some politicians. You have been tasked to settle this matter.

**Task:** As a Chemistry student:

- a) Explain the category of the materials in the landfill.
- b) Advise the community members on the suitability of the materials that make them useful in daily life activities.
- c) Advise on the danger of the materials to the environment.

**66.** The gaseous hydrocarbon X is a carbon – based fuel used in racing cars formula – 01. Its internal complete engine combustion, gave out carbon dioxide gas, water vapour and heat energy according to the equation below:



The preliminary experiment shows that hydrocarbon X contains 80% carbon and the rest being hydrogen whose relative molecular mass is 30.

However, the ministry of games and sports wants to know how to determine the molecular formula of X and how much volume of the carbon dioxide gas in litres will be emitted if 80g of X were completely burnt to produce heat energy.

**Task:** Use your chemistry knowledge to: a) Explain the:

- i) Category of the homologous series used as carbon – based fuel.
- ii) Suitability of the gaseous product(s) emitted.
  - b) Guide them on how to determine the:
    - i) Empirical formula and hence molecular formula of X (C = 12, H = 1, Mr = 30)

Volume of carbon dioxide gas emitted into the atmosphere from a single race when hydrocarbon X in (b) (i) is burnt completely in oxygen. (1 mole of a gas occupies 24l at r.t.p; 1mole of X liberated 2moles of carbon dioxide gas)

- ii) Advise on the impact arising from using this fuel type to the environment.

**67.** The National Environment Management Authority (NEMA), has organized a two days" students workshop to take place at Rock Classic Hotel – Tororo to discuss key issues concerning about conservation of environment. On day 1, the Programme drafted on paper has a key statement to be addressed which reads. **"Today's society in view of modernization has neglected the mother nature of water, which has ultimately cost us on health. This needs urgent solutions"**.



**Task.** Prepare a speech you would deliver at the workshop about the key statement.

**68.** In our day to day life at home most of us use carbon compounds such as petroleum products, wood, charcoal and biogas as source of fuel. Research shows that continued use of these fuels has greatly affected our resources from which they are obtained.



- a) Explain any six (6) ways how we can sustainably use the available resources
- b) The main component of biogas is methane ( $\text{CH}_4$ ). Methane is the simplest compound obtained from crude oil which contains a variety of compounds but with similar structures.
  - i) Identify the class and write the general molecular formula of the organic compound to which methane belongs.
  - ii) Name and write the structural formula of the next member of the organic family after methane.

**69.** Large deposits of oil have been discovered in Lake Albert near Hoima city. Crude oil contains a variety of different compounds but with similar structure. The simplest of these compounds is methane of molecular formula  $\text{CH}_4$  and many others.



- a) Identify the class and write the general molecular formula of the organic family to which the components of oil belong
- b) Name and write the structural formula of the next two members of the organic family named after methane
- c) Giving a reason for your answer, state one method by which the components of crude oil.

**70.** Sodium, magnesium, aluminium, silicon, phosphorous and sulphur are some of the elements in period 3 of the Periodic Table, the teacher is interested to investigate about their chemical and structural properties of the products after their combustion in air to form oxides. He burnt each element separately in plenty supply of oxygen to form respective oxides, and the preliminary results were obtained as shown in the table below:

Element	$_{11}\text{Na}$	$_{12}\text{Mg}$	$_{13}\text{Al}$	$_{14}\text{Si}$	$_{15}\text{P}$	$_{16}\text{S}$	
Oxide	$\text{Na}_2\text{O}$	$\text{MgO}$	$\text{Al}_2\text{O}_3$	$\text{SiO}_2$	$\text{P}_2\text{O}_3$	$\text{SO}_2$	

However, the teacher not only wants to know the nature of the chemical compounds involved in the oxides formed but also how the structural properties affect their usefulness in daily life.

You have been asked to give guidance.

Task: As a chemistry student: a) Explain;

- (i) the type of compound(s) formed in the oxides
- (ii) the properties of any two oxides relative their usefulness in daily life.

b) Explain the impact of any one of the oxides formed to the environment.

**71.** In a certain school, the latrine is near senior three class. The foul smell disturbs the students in the class and the smell becomes much more on the hot day.



- a) Explain briefly how the smell molecules are able to move from the latrine up to the classroom.
- b) Explain why the smell from the latrine become much more during the hot day.

**72.** Mulago National referral Hospital, the Orthopedic Medical department, the medical specialists who focus on the diagnosis, treatment and prevention of musculoskeletal system disorders encompassing bones, joints, muscles, tendons and ligaments, has advised the government of Uganda to install a simple but more effective MRI (Magnetic Resonance Imaging) system.

A system that when used, allows a radioactive element to decay faster, emitting gamma rays that can be used take detailed images of the inside body in diagnosis of broken bones, ligaments and muscles of injured patients. However, many people are worried about these forms of treatments to be dangerous and life threatening. You have been asked to give assistance.

**Task:** As a chemistry student;

- Identify the type of nuclear process(es) involved.
- Suggest any other function of the form of the energy emitted.
- Explain any other danger(s) arising from the form of energy released and give its mitigation.
- Evaluate the nuclear processes installed

**73.** Chemistry is one of the most prestigious science subjects studied at the secondary level of Education. When you study chemistry, you do not only acquire knowledge about many chemical reactions and other substances, but you can also take up various careers after school.



- Identify any three careers that you can take up through studying chemistry.
- Briefly describe how the knowledge of chemistry has been applied in the following field in the Ugandan economy;
  - Agriculture.
  - Medicine
  - Cosmetics industry

**74.** Eritukire Reagan, a S.1 learner has studied Chemistry for two months now; his mother is a senior researcher. On visitation day, Reagan and his mother had a lengthy talk about science subjects offered in the school; their relevance in daily life and contributions to the economy. Chemistry being one of those subjects.



**Task.** Show how best Reagan would show his father that chemistry has contributed to the economic growth of the country.

**75.** Kintu Chrispus lives along the channels of a water body which supplies the entire village of Masajja with water. He has many cows which drink and move within the water body. He has a big plantation of crops next to the water body on which he uses a massive amount of fertilizers to ensure that he get high yields. He normally cools his machines in water and his wife earns a living by washing clothes daily for people in Masajja. The wife uses detergents and soap to wash the clothes.

**Task.** Write a piece of advice to Kintu Chrispus letting him know about the ways his family and activities pollute the water body, the possible effects the pollution could do to Masajja and how he can participate in solving the problem of water pollution in the area.

**76.** Nanyonjo Zahara is a student in Buwenge College in Jinja district. When in the chemistry class, Mr. Ngambo Wilson taught her that melting of candle wax when a candle is burning is a physical change. The teacher told them to go and research more from a particular book in the library about chemical and physical changes. On reading the book, she found that a burning candle has both physical and chemical changes. Zahara wondered which chemical change is in the burning candle since their teacher had only said that a burning candle has only physical change. When she went back home, she saw the uncle splitting firewood into small pieces. At the same time, her mother was using the splitted pieces of wood to cook food.



**Task.** Write a message to Zahara sensitizing her in her research about the various chemical and physical changes to present to their teacher.

**77.** It is believed that Kinetic theory of matter states that “matter consists of very smallest indivisible particles in a state of random motion”, during a senior two discussion, teacher Wilson instructed learners to come up with everyday examples demonstrating the experience of properties in water. Jacob presented his example before the whole class :his presentation was “ when someone closes himself in a dark room with windows and doors and looks it a ray of light penetrating through one simple hole in one piece of iron sheet , dust particles are seen moving in Zigzag pattern” The teacher however can firmed Jacob’s findings.

**TASK.** As a learner of chemistry,

- Explain why the dust particles are seen moving in a zigzag pattern?
- Assist the teacher to draw a conclusion for Jacob’s simple experiment?
- Explain what would be observed with in the ray of light when the room gets hotter?

**78.** Resty wants to connect water to his residential house. These are various materials she could use for constructing a water tank stand whose nature and properties determine their suitability. However, she needs to be advised before buying the materials and has asked a local builder to educate him. The builder decides to come to you for advice.

**TASK.** As a learner of chemistry, Use your knowledge of chemistry to explain,

- Nature of materials.
- The suitability of materials.
- Advise Resty on the choice of materials for use and their impact on the environment.

**79.** It is believed that air is a mixture of gases with 21% oxygen, as the demand for oxygen increases in the hospital right from the Covid -19 seasons; the government has employed scientists to manufacture the gas from the air. When the members of science club heard it, they wondered how the process of production would be and you are concerned to present to them.

**Task.** As a learner of chemistry, prepare a write up you would use in your presentation.

**80.** Charles wishes to start up a textile industry to produce materials to be supplied to the nearby schools for making uniforms. Charles believes that choosing a quality material depends on the properties of the material but he is confused of which material to use and has come to you for advice.

**Task:** As a leaner of chemistry;

- Explain the categories of the materials Charles may use
- Advise him on the suitability of the materials.

(c) Advise him on the choice of these materials.

**81.** During the dry season, Ivan practices bush burning. He grazes his goats on a community land. And also takes his goats to drink water from the community water source. Ivan's practices have raised concern in the community and the area chairperson has organized a meeting to create awareness for Ivan and the community.

**Task:** As a learner of chemistry, make a write-up of the message the chairperson will present to the community.

**82.** You were part of the class that visited one of the stone quarries. You Noticed that explosives were being used to blast big rocks to form small stones (aggregates) and there was a lot of dust rising into the air as shown in the figure below.

Besides the social benefits, your friend was concerned about what would happen to the site and community if the activity continued over time.

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

**83.** You have studied that chemistry is a central science because it is linked to many other scientific fields of study.

Show how the knowledge of chemistry is applied in the;

- i) Biological field.
- ii) Physics field
- iii) Engineers need to know that substances expand when they are heated. Mention three areas where engineers use this knowledge when designing things.

**84.** Many people are wondering why smoke is produced by some lighting/heating equipments e.g candles, kerosene lamps or even when burning fuels such as rubbish, paraffin, plastics etc whereas some heating/ lighting equipments such as stoves, gas cookers don't produce the smoke. To add on they wonder why some motorcycle engines produce smoke whereas some do not.

**a)** Using the knowledge of chemistry, describe what smoke is and explain the possible cause of smoke production

**b)** How is it possible for smoke particles to move in space?

**c)** Your mother heard on the radio during a certain programme that milk powder can be prepared from fresh Milk using the evaporation to dryness method.

She asked you to suggest how the Milk powder can be prepared. What would you tell her. Put it in Writing.

**85.** During a classroom lesson, the motion was “wooden chairs are better than plastic chairs”. What points would you write to;

- i) **propose** the motion.
- ii) **oppose** the motion.

**86.** You noticed that a **wet** cloth you hanged inside a house during the night was **dry** by the time you checked on it in the morning after waking up. Explain how this was possible?

**87.** If you have an old aluminium saucepan at home, explain how you would use it to manufacture a spoon.

a. During water transmission under the soil surface, **plastic pipes** are normally used instead of **metallic pipes**. What explanation can you write about this?

b. In your village, people dispose a lot of plastic waste. However, the only solution they have to reduce their amount is collecting and burning them.

**88.** As a concerned student, what can you write to the chairman informing him about the dangers that can result from burning plastics?

a. If the chairman calls you to address a group of people about other ways they can manage plastics instead of burning them, what would you tell them. Summarize your speech in writing.

**89.** Mr. Kamuntu intends to enter in his newly constructed house, but the house lacks metallic frame materials suitable for the doors and windows. He would like to purchase them from the nearby hard ware shop in the area. Although his constructors suggested that, he gets the best metal materials that have good quality structural properties. However, he remained skeptical, and he needs your guidance on the best structural properties of the materials to be used.

**Task:** As a Chemistry student:

a) Explain to him the category of the materials

b) Advise him on how the material is suited for its uses in daily life.

c) Of what danger is the material to the environment with mitigation.

**90.** Sarah's young brother bought ice from the Canteen, on reaching home, mum sent him to the shop to buy sugar and he forgot his ice on the veranda, which is directly heated by the sun. On returning, he found out that all the ice had turned to liquid and flowed, after some time he noticed that the veranda he did not mop was dry and he wondered how it came about.



**Task:**

As a chemistry student, write a message explaining to him what caused the changes he saw using your knowledge of the kinetic theory of matter.

**91.** A debate struck amongst senior one learners at Riverside College Tirinyi about Chemistry as one of the prestigious subjects studied as they were relating it to different activities in the society. One group of learners claimed that those who study chemistry only become chemistry teachers while another group claimed that there are many careers related to the study of chemistry.

**Task.** As a chemistry learner,

- Assist the learners to identify any three other careers related to the study of chemistry in order to settle their argument.
- Briefly describe how the chemistry knowledge is applied in the careers identified in (a) above.

**92.** A new factory is in the process of re – constructing the body of an old cargo aero plane that recently got destroyed resulting into several leakages. They intend to make good and strong metal materials from the available metal they have in the stocks. The preliminary report, shows that they intend to use 90% aluminium with 10% magnesium after mixing them to form the desired metal materials needed in the re – construction process. However, the factory manager is interested to know whether the products formed will be environmentally friendly beside its usefulness. You have been approached to offer guidance.

**Task:** As a Chemistry student: a) Explain the;

- i) Category of the metal product used.
- ii) Suitability of the metal product besides its usefulness in daily life.
  - a. Explain the impact of using these materials to the environment.

**93.** Eva was in a conversation with her young brother and suddenly her brother talked of where the rain comes from, her brother thinks that rain is sent by God to us, a concept which seems to be right since rain is not made by man. Eva told her brother that he is right though using knowledge of chemistry we can further explain how rain comes to be formed since it is recyclable.



**Task:**

As a chemistry student;

(a) Write a short message helping Eva to give a precise explanation to her brother.

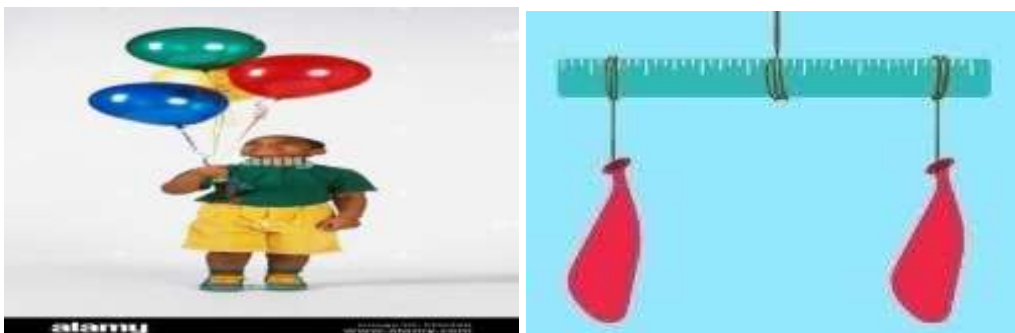
**94.** Nsegera is a welder who works with binding iron metals to make windows and doors at Nsegera and sons metal fabrications. He has a small store which cannot accommodate his metals and therefore leaves most of them outside. After a week, he found his metals developing a reddishbrown appearance. The metals had weakened and could no longer be used to make windows.



**TASK:**

As a chemist, design an experiment to demonstrate the occurrence and advise Nsegera on the ways through which he can avoid the occurrence. Hence explain the Observation. (Include the equation for the reaction.)

**95.** James wanted to celebrate his birth day with well inflated decorated balloons, he decided to inflate all the balloons 3 days before to the birthday and kept all of them in one room. Early in the morning on the birthday, he wanted to do the decoration but found when all the balloons had shrunk (reduced in size), this greatly left him wondering how that happened.



### Task

As a senior **two learner** who now understands kinetic theory of matter, clearly state it and advise James on why that happened.

**96.** Akello a senior one student washed her school uniform and hanged them in a line.

Unfortunately, the weather became too cold. Immediately Akello was worried a lot about what she will wear the following day at school because she knew that the school uniform will not get dry and yet she does not want to miss any single day without going to school.



### Task

Help Akello to clear off her doubts and worries.

**97.** River Mpologoma is one of the natural sources of water people of Tirinyi use. In this community, some people stay near this river and the tap water people use from this area is extracted from this river but due to some human activities the water is highly polluted and now people are worried and have stopped using even the tap water. The National Water and Sewage Corporation (NWSC) has organized a workshop to sensitize the people of Tirinyi community about the human activities that pollute the water and how to make this water from river Mpologoma safe for use.

**Task.**

You have been invited as one of the speakers in this workshop, Make a write up you would use in order to clear up your people's worries and in your write up, explain to them how the water from the river is formed.

**98.** Okao is in the process of constructing his house without affecting the environment. He wants to build a good strong house; there are various building materials of different quality and properties on the market. However, he does not know the quality of materials to use.



Okao knows that choosing quality materials depends on the nature of the material and has come to you for advice.

**Task**

Use your chemistry knowledge to;

Explain

- a) Categories of materials.
- b) The suitability of the materials.
- c) Advise Okao on the choice of materials.

**99.** Mudhiba, staying in Amoru village in Amuria district is currently living in fear. This is because he has noticed that whenever he uses water from the well for washing clothes and dishes, he happens to use a lot of soap, on top of that, he finds marks on clothes and the dishes. However, this is not the case when he uses rain water or boils water from the well before washing. Abel is really confused, frightened and he is attributing this to witchcraft.

**Task.** As a chemistry student;

a) Help Mudhiba to;

i) Understand the type of water in the well.

**ii)** Understand how the water from the well is formed.

**iii)** Know the ions responsible for the effects of that particular water type named above.

**b)** Advise Mudhiba on the possible ways of removing those ions and improve the quality of that water from the well. (Use chemical equations to illustrate your work).

**100.** Abu, a student of Mbale secondary school is trying to understand the occurrence of carbon in the environment. He was doing research and found out that, pure carbon is found in the form of diamond and impure carbon as graphite and that carbon is allotropic and therefore has allotropes.

### Task

As a S.3 learner who has studied chemistry;

**a)** Help Abu to;

**i)** Understand the meaning of allotropes. **ii)** Point out the **(3)** allotropes of carbon.

**iii)** Cite out the properties of diamond and graphite, and in each case give two uses of each.

**b)** Inform Abu on any other element that has allotropes as carbon does, hence give the allotropes of that element.

**101.** Zinc sulphate is a common, soluble salt found in *Ora<sup>T</sup>* tablets given to patients with Zinc deficient symptoms. As an expert pharmacist at Cipla pharmaceuticals, you have been assigned to guide newly employed pharmacists on how to prepare the pure dry crystals of Zinc sulphate salt that will be used in the tablets.



**Task;** In your guidance you are required to;

**i)** State **two (2)** substances from which *Ora<sup>T</sup>* can be prepared?

**ii)** Mention the type of reaction that occurs during the preparation.

**iii)** Write a well-balanced molecular equation of reactions that occurs.

**iv)** How can the *Ora<sup>T</sup>* tablets be prepared in the laboratory from dilute Sulphuric acid?

**v)** With an example, mention any other **four (4)** uses of salts in our daily lives.

**102.** Mr. Omeri Peter a resident of Kumi always instructs his daughter using written messages to go and buy some things from the centre to be used at home. One morning as he was going to work, he left a sheet on the table instructing his daughter to go and buy an alkane. The daughter having little knowledge didn't know what an alkane is and what it's used for. She was now living in fear and doubts that what if her father had sent her to buy poison or an acid.

As a student who has studied carbon in life, help Mr. Omeri's daughter to clear off her doubts.

**103.** In a certain family, there struck a wrangle between the father, mother and their son James who is currently studying in S.2 at Rwenzori High school in Kasese. The discussion was about the effectiveness of the new laundry soap they purchased for their house hold. The son claimed that every time he washed his uniform shirt using the soap which the father brought, stains could remain in the shirt even when he followed the guidelines of using the soap. The father claimed that it was an issue with the person washing while the mother claimed it was due to the water James used during washing. James decided to investigate the chemistry behind this challenge.



**Task.**

(a) As a S.3 learner who has studied the chemistry of detergents, (i) Explain to James the category of the soap he used during washing.

(ii) Describe to the son how the detergent he used works.

(iii) Advise the Family on the potential reasons why some stains may not be fully removed by the detergent and suggest possible alternative cleaning methods.

**104.** The Uganda Battery limited UBL, one of the oldest industries in Uganda, intends to expand her production by making more of the car batteries that use Sulphuric acid with the aim of meeting its high demands in Automobile industries using the available raw materials they have in stock in Kilembe copper mine in Kasese District. However, the locals in the areas have raised their fear due to exposure to potential harmful fumes, the factory emit in to the environment besides them providing employment opportunity to the community.

**Task:** As a chemistry student, Make a write up guiding message sensitizing the community on how the whole production process will be conducted.

**105.** Fertilizers are added often to boost soil productivity. One of such is ammonium nitrate which is often imported at high costs. To boost the local production of ammonium nitrate. Government recently cleared Bloom Uganda limited set up ammonium nitrate production plant in one of the villages in Mubende district with minimal environmental impact.

The locals however don't know the process of production will be carried out.



As a result, a radio talk show has been organized at one of the local radio stations to sensitize the locals.

**Task:**

Prepare a presentation you will make during the talk show if you were invited.

**106.** OBO, a resident of Tukum village a place where they use borehole water, slid, fell and his white shirt became dirty. He decided to use a detergent to clean his shirt. The shirt remained with some brown spots yet he had rinsed it several times.

**Task.**

As a chemistry student;

- a) Suggest a problem OBO made when choosing a product.
- b) Help OBO understand how the product works.
- c) Advise OBO on the challenges associated with the long term use of the product.

**107.** In Kasambya sub-county, many people use pit latrines as an area of disposal of human waste.

These latrines produce a lot of bad smell whenever it clocks 1:30 to 2:00pm.

**Task.**

a) As a S.4 learner, write a report to the people of Kasambya sub-county explaining to them how the bad smell molecules are able to move.

- b)** Why the smell increases during a given time?
- c)** What advice would you give to them on how they can avoid the bad smell?

**108.** An investor intends to produce Lime, a key chemical needed in the manufacture of paints and coatings besides glass manufacturing. He intends to use the available raw materials they have in stock in order to achieve their targets and expectations in the production process of Lime.

However, the locals in the areas are worried about the potential harm the factory could cause to the environment and how the whole production process will be conducted. You have been tasked to give guidance.

**Task:** As a chemistry student. Make a write up message sensitizing the community on the environmental management programs and how the whole production process will be conducted.

**109.** Whenever Kawaga would fall sick, he resisted going to hospital and chewed leaves of mangoes, eucalyptus plus a cup full of hot water in which he dissolved seeds of Dutchman's pipe. This time he was infected with cough, flu and fever with convulsions and was rushed to a nearby health facility. His body temperature was high and was given some tablets then an injection. Kawaga's condition improved tremendously.

### Task

- (a) Point out why Kawaga was rushed to a healthy facility?
- b)* Help Kawaga to understand how the tablets he received and the injection work
- c)* Advise Kawaga on the long term use of medicine.

**110.** Constructors abandoned some materials at the construction site which James discovered while leveling the compound. They included some metal pieces, polyethene and cloth. Some cloth broke into tiny pieces while others remained intact. James was disturbed on how best to dispose off the materials that remained intact and is seeking for advice from the owner of the building.



### Task

Using your knowledge of chemistry;

(a) Help James;

(i) classify with reason the abandoned materials

ii) State the properties of the materials he found abandoned.

(b) In what ways were the materials suitable for the uses they served?

(c) Advise James on the impact of the materials on the environment.

**111.** Electricity connectivity in most parts of Uganda is still very low and rural communities have continued to cut down trees for fuel which is affecting the environment and likely to cause climate change. Kilembe mines can be revived to extract the metal for making electric cables which would benefit the communities despite the impact of the extraction process.



**Task**

Using your knowledge of chemistry, make a write up of what the officials would present to the residents.

**112.** Kamu-Kamu women's saving group have a ten acre forest of eucalyptus trees from which they have been harvesting fire wood to sell in the local market and beyond but could not fetch them enough income. The women decided to cut the trees for wood charcoal. This attracted the National Environment Management Authority (NEMA) officials to stop them. The action taken by Nema authorities was harsh and the women objected to it demanding a clear explanation and alternative ways of benefiting from natural resource.

**Task**

Using your knowledge of chemistry, help the women understand why NEMA stopped their economic activity.

**113.** Mary's house maid often prefers using wood charcoal to natural gas for cooking which results in some delays in the preparation of food compared to the days natural gas is used. Mary now wants to know the cause such that the maid can be advised accordingly.

**Task ; Using your knowledge of chemistry,**

- (a) Help Mary;
  - (i) Categorize the product Mary's maid preferred.
  - (ii) Understand how the product works.
- (b) Advise Mary on long term use of the desired product.
- (c) How do the two fuels compare with each other?

**110.** A donation to the school of sports and games equipment comprised of balls, nets, flags, javelin short put and pressure pumps. The prefect realized the equipment were made of different materials and that their nature and properties influenced their purpose. However, the games master was disappointed when he asked the prefects to sort the equipment for storage and he couldn't.

**Task; As a student of chemistry;**

- (a) Help the prefect with reason categorize the materials.
- (b) State the properties of the materials that influenced their suitability.
- (c) Advise the prefect on the choice of materials for the different equipment. (d) What is the impact of the materials on the environment?

**111.** In most areas, buildings are at a standstill due to unaffordability of cement. Residents of a certain village have been quarrying rocks in their area and were told that the same rocks could form cement. An investor through the LCV chairperson wants to set up a cement producing industry in the area but this has attracted resistance from many residents. The residents claim ignorance of the entire process and have demanded to be educated for proper decision making.



**Task**

Using your knowledge of chemistry, make a write up of the expected presentation of the LCV chairperson to the residents covering the process of production, impact on the environment, mitigation and social benefits.

**112.** The collapse of tall buildings and bridges, has partly been blamed on low grade materials used in construction. The ores for extraction of iron are abundant in Osukuru. A company intends to build an industry in the area and the officials want to meet the residents for an educative talk.

**Task**

As a chemistry learner, make a write up of what the company officials would present to the residents.

**113.** Kalonzo a compound cleaner advised students not to burn rubbish on the school compound but seek other means of disposal. This resulted into accumulation of garbage which made the deputy head teacher to intervene and ordered for the rubbish to be burnt. This activity did not go well with the learners in the adjacent classrooms. The lessons were abandoned as the students and teachers sought for safer places.

**Task**

Make a write up of why Kalonzo could be right in his advice to the students.

**114.** Kigayaza residents practice stone quarrying to earn a living. The quarry is on school land. The board of governors of the school have deemed it necessary to stop this activity because of its associated challenges. The community feels it is not right for the school authorities to stop them from using the natural resource and have organized through the LCI chairperson for a meeting with the school authorities.

**Task**

As a student of chemistry, prepare a write up of the presentation you expect the school authorities to deliver to the community covering the identity of the natural resource, its composition, impact on the environment, how it occurs, mitigation and social benefits.

**115.** A man from the village is not used to brushing his teeth with a tooth paste after a meal every evening and requested to be educated about the underlying facts behind this practice. He felt just washing his mouth with water was sufficient enough to stay clean.

**Task;** As a chemistry learner;

- (a) State why it was necessary to use a toothpaste.
- (b) Help the man understand how it works.
- (c) Advise the man on the challenges associated with long term use of the paste.
- (d) How does the method compare with the man's way of maintaining clean and healthy teeth?

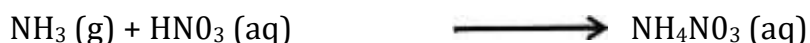
**116.** A rich man was in the process of connecting water to his newly constructed residential building. There are various materials he could use for constructing a water tank stand whose nature and properties determine their suitability. However he needs to be advised before buying the materials and has asked a local builder to educate him. The builder decides to come to you for advice.



### Task

- (a) Use your knowledge of chemistry to explain; (i) the nature of materials. (ii) The suitability of materials.
- (b) Advise the rich man on the choice of materials for use and their impact on the environment.

**117.** The greatest percentage of rural communities survive on agriculture. The soils have become infertile and crop yields and harvests poor. Food security is dependent on use of artificial fertilizers which are quite expensive. The farmers are considering constructing an industrial plant to manufacture nitric acid that can be used to make a fertilizer with minimum environmental impact.



However most farmers are ignorant about the entire process of production, side effects, mitigation and the social benefits for which they are seeking to be enlightened. Task

Using your knowledge of chemistry, prepare a write up to address the farmers.

**118.** A women's group dealing in selling matooke (bananas) and millet have registered heavy losses due to ripening of bananas and germination of millet in storage. A parent who visited the school on the science fare, remembers that a sanitizer which is now on high demand due to red eye infection can be processed from these materials. The parent has consulted the leaders of the women's group and advised them to come to your school for an educative visit.



**Task;**

As a student of chemistry, prepare a presentation of the message the women would use to produce and market the sanitizer.

**119.** Lwera is a big wet land that has of late been heavily encroached on for sand mining by some investors. The wet land is next to Lake Victoria. The investors use heavy caterpillar graders and trucks and have constructed temporary settlement, fenced off the area from local residents who felt cheated. Besides this, the activity was impacting on the environment. The parliament of Uganda debated the matter and a decision was made to revoke/ stop the activity.

**Task**

As a student of chemistry make a write up of the presentation the residents must have forwarded to their member of parliament on the natural resource for consideration.

**120.** In most urban centers, waste management and disposal is a big challenge that has kept the local authorities seeking for solutions. In one slum, some residents pass stool into polythene papers and dispose off in the nearby water channel. Garbage and plastic materials are scattered almost everywhere. This has prompted the local authorities to organize sensitization workshops to address the challenge.

**Task**

As a student of chemistry, write a presentation of the message you would expect the local authorities to use to sensitize the residents.

**121.** The gaseous hydrocarbon X is a carbon – based fuel used in racing cars formula – 01. Its internal complete engine combustion, gave out carbon dioxide gas, water vapour and heat energy according to the equation below:



The preliminary experiment shows that hydrocarbon X contains 80% carbon and the rest being hydrogen whose relative molecular mass is 30.

However, the ministry of games and sports wants to know how to determine the molecular formula of X and how much volume of the carbon dioxide gas in litres will be emitted if 80g of X were completely burnt to produce heat energy.

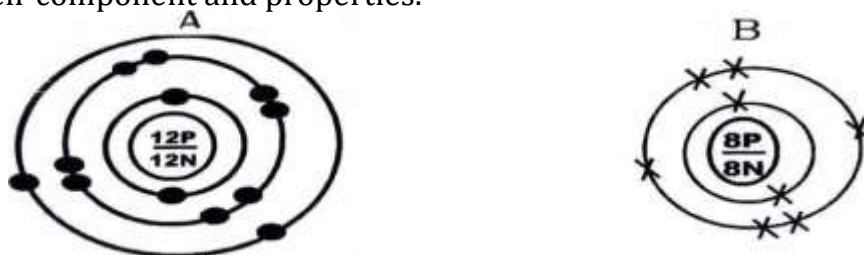
**Task:** Use your chemistry knowledge to: a) Explain the:

- i) Category of the homologous series used as carbon – based fuel.
- ii) Suitability of the gaseous product(s) emitted.

b) Guide them on how to determine the:

- (i) Empirical formula and hence molecular formula of X (C = 12, H = 1, Mr = 30)
- (ii) Volume of carbon dioxide gas emitted into the atmosphere from a single race when hydrocarbon X in (b) (i) is burnt completely in oxygen. (1 mole of a gas occupies 24l at r.t.p; 1mole of X liberated 2moles of carbon dioxide gas)
- c) Advise on the impact arising from using this fuel type to the environment.

122. Okello while checking on his son's chemistry notes, found drawing of structures that resembled what he studied about planets while in P. 7. He wondered how this becomes chemistry and not geography. He invited his son to clearly explain to him what the drawings meant, their component and properties.



**Task;** As a learner of chemistry help Okello's son;

- (a) explain to his father what the structures mean
- (b) State the components in the structures and their properties.
- (c) give advice to Okello on the likely uses of the substances A and B
- (d) state the effect on the environment of long term use of substance A

123. Strong basement of a storage building requires the use of iron bars and concrete of appropriate strength to support the weight and avoid collapsing. Low density aluminium is largely used to make lifts, door and window frames. Most of the materials are available in the local market except aluminium which is imported and quite expensive. The ores of aluminium are available in Karamoja district and an investor wants to set up an aluminium extraction industry to support the economy. The LC. V chairperson has welcomed the idea and through a radio talk show wants the investor to sensitize his people on how the mineral can be produced, the impact of the industry and social benefit.



As a chemistry learner make a write up of the presentation the investor is expected to deliver on the radio talk show.

**124.** The government of Uganda intends to extract and refine the crude oil deposit that was recently discovered in Kibiro on the shores of Lake Albert in Western Uganda with the aim to meet the Country's Energy demands. However, up to now, the extraction process has delayed to kick start, due to the expected high potential risks of environmental contamination from the mining and refinery activities in the areas. The engineering team is organizing a sensitization forum with the district local government, councilors and the community and you have been invited to be part.

**Task:** As a Chemistry student. Make a write message containing information you would like to use on that day's meeting upon invitation.

**125.** A non-governmental organization dealing with the impact of refugees on the hosting communities in West Nile region, observed a number of challenges that impacted negatively on the natural resources. The refugees carried out activities such as grazing, cultivation, cutting down trees for firewood and charcoal, brick making, molding soil for houses, cutting grass for mud and wattle houses, brewing alcohol and many others. The environment was noisy, dusty with generally poor sanitation, malaria was quite common and poor harvests as the soils are left bare and eroded.

The poor handling of natural resources has caused total environmental degradation and the NGO has organized awareness talk shows to solve the challenges.

### **Task**

As a student of chemistry make a write up of the awareness the NGO officials are expected to present to the refugees and the hosting population.

**126.** Fishing is a major economic activity in most waters of Uganda. The fisher men use a variety of methods including local herbs and undersize nets for catching fish. Some of the boat engines are old and pour oil in the water. Chemicals like detergents are released directly in the water including some human wastes. Factories around the water showers release hot water and sewage into the water bodies. This has prompted the government to strictly oversee the activity and ensure fish is not contaminated and there is market for it abroad. The head of the unit plans to sensitize the fishermen.

### **Task**

As a chemistry learner help the head of the unit to sensitize the fishermen about the natural resource, how to harvest them, their contribution and impact.

**127.** Margret participated in serving guests at a S.4 prom party. She discovered that the life style of the elderly and youths was completely different basing on their choices of menu. The elderly guests preferred boiled foods, a fruit and water whereas the youths preferred fried foods and bottled soft drinks of different colors tastes and flavors.



Margret was bothered and wanted to know why the youths had preferences quite unique and similar.

**Task;** As a learner of chemistry help Margret;

- (a) Categorize the preferences made by the guests.
- (b) To explain how the materials that influenced the youths choice work.
- C) To advise the youths on the long term consumption of the foods and drinks they preferred compared to that of the elders.

**128.** The organizers of events prefer to use materials that are easy to carry, affordable and effective with less environment impact. They understand that the choices of materials and suitability for use relies on their nature, properties and impact on the environment. Nambafu one of the event organizers wants the materials categorized with their properties and uses stated so that he can help advice many groups planning to start up catering services.

**Task;** Using your chemistry knowledge help;

- a) Nambafu categorize the type of materials the starter of catering services should buy.
- b) Nambafu explain the suitability of the materials he has recommended to be bought.
- c) To advise on the choices of the materials recommended.
- d) State the effect of the disposal of the used materials on the environment.

**129.** A chemical and fertilizer industry manufacturing Sulphuric acid, phosphate and sulphate fertilizers existed in Osukuru Tororo district. A farmer cultivating near the abandoned mine wants to understand the processes involved in the manufacture of the chemical and the sulphate fertilizer that makes his crop yields and harvests better every season. His fellow farmers are ignorant but know the fertilizer as an ammonium compound made from ammonia.



### Task

As a learner of chemistry, help and write a presentation that can be used to educate the farmer.

**130.** The demand for cheap and clean fuel is ever rising and some residents have embraced charcoal burning as a serious economic activity though it also has a number of challenges. Charcoal is affordable and the raw material is renewable. Kiwule inherited a forest from his father and wants to sustainably cut some trees for charcoal but does not know exactly how wood is turned to the fuel.

### Task

Using the knowledge from chemistry help Kiwule understand the process involved in production of the fuel.

**131.** Pius rears animals and also practices agroforestry. His land extends to the river and has planted trees close to the river banks. His neighbor carries out similar activities but was evicted out of his land close to the river because unlike Pius he planted trees on highland and cultivated in the river shores. Pius could not face each other with his neighbor who claims that Pius has planned for his downfall leading to his eviction from the fertile soils close to the river banks. Pius needs somebody to explain to his neighbor why his eviction by the environment officer was a right move and he should take it in good faith.

### Task

Using your knowledge of chemistry make a presentation Pius would expect to convince his neighbor about the just action taken against him by the environment officer.

**132.** John was surviving on church land. He built a temporary grass thatched house in which he slept together with his goats and poultry. John received a visitor who spent a night in his house. The visitor advised his host to quickly save himself from dying early and build another house for the animals and cooking. John felt insulted and wondered whether people who live in two houses do not die at tender age.

Present a write up that you would use to convince John that it is right to live in separate houses with animals as well as cooking.

**133.** Ms. Balanda has a restaurant in Iganga Town. The customers have these days abandoned her restaurant because of poor taste of food, unpleasant scent and food gets spoilt after a very short time. The appearance of cooked food is also not attractive and the soup is always too dilute. She wishes to acquire different substances which would be added to her food to produce meals attractive to her customers. She has contracted you as a chemistry student well knowing that you can advise her on the right products /substance to buy.

(Support material)



**Task.**

Write a piece of advice to her on: -

- Category of the substance/product
- Uses of the different substance/product
- Side effects of using the different products/Substances on customers and mitigation.
- Evaluation of the substance/product.

**134.** Mayuge District local Government has planned to create Jobs for Jobless youth by setting up an industry that makes Kitchen Utensils. However, they do not know the various materials and their properties that can be used to make the items. The district has contacted the chemistry department of your school to advise them on what elements /substances to be used as raw materials.

**Task:**

As a chemistry student who has learnt about periodic table, write a presentation you would give upon invitation being selected by the head of department.

- On the category of elements [substances]
- Suitability of the element/substances.
- Choice of the element/substance
- Impact of the elements/substance on the environment and mitigation.

**135.** In some districts of Uganda like Tororo district, farmers get very low crop yields due to poor soils that has led to persistent famine in the area. Ammonium nitrate is one of the effective fertilizers used to improve crop yields. The ministry of agriculture and animal husbandry has entrusted an investor to put up an ammonium nitrate production plant in Tororo district such that the fertilizer is got at cheap cost. However, the community near the site is worried about its effects on the environment and how the environmental process will occur.

The head of department has appointed you to sensitize the community.

**Task:** Prepare a presentation you will make during the meeting.

**136.** In Masese Division Jinja city some residents near the lake are involved in certain activities like rearing animals, growing crops, distillation of ethanol and washing clothes from lake banks. Recently it has been discovered that the fish has started dying and people who use the water for bathing develop rashes. This has attracted the attention of officials of the ministry of health and have been invited for discussion to u-y and discover the causes of what is happening.

A sensitization workshop is to be conducted to explain the existing situation in the area. The theme of the workshop is **MY ENVIRONMENT MY RESPONSIBILITY**.

**Task:**

As a chemistry student, write a presentation.

**137.** Iron (II) sulphate ( $\text{FeSO}_4$ ) is a salt found in tablets given to pregnant women who appear pale due to having a certain element in insufficient amounts in their bodies. This salt can be prepared in the laboratory by reacting a certain metal in excess amounts with a dilute acid. a) Name the i) Acid used. ii) Metal used.

b) Explain why the metal used should be in excess.

c) State the deficiency disease that requires administration of the above tablets.

**138.** The atomic numbers of atoms of elements **M**, **R** and **W** are 7, 13, and 17 respectively. **M**, **R**, and **W** are not the usual symbols of the elements in the Periodic Table.

a) Umar, a local electrician in Kisoro wants to select an element to be used for his job.

i) Which of the above elements can he use?

ii) Suggest **two** reasons to support the choice of your answer in (i) above.

b) **Two** of the above elements belong to the same period in the periodic table.

- i) Write the symbols of these **two** elements.
- ii) Suggest a reason for your answer in (i) above.

**139.** Charcoal (C) and ethane (C<sub>2</sub>H<sub>6</sub>) are some of the substances that are good sources of fuel in homes and factories.

- a) What is a fuel?
- b) Write a chemical equation for the complete combustion of ethane.
- c) Suggest the **disadvantage** of excessive use of the above fuels to the world.
- d) A Village Health Team (VHT) in Kasambya, Kyotera is always advising his people to avoid cooking using charcoal stoves while inside rooms with closed doors and windows. Suggest a reason for the VHT's advice.

**140.** The observations made when some metals were allowed to react with water are shown in the table below

Metal	Observation
A	No observation with water nor steam
E	Vigorously react with cold water
T	Fairly react vigorously with cold water
X	Very slow reaction in water but fast when heated in steam

- a) Identify the metal which is
  - i) Most reactive
  - ii) Least reactive
- b) Arrange the above metals in order of decreasing reactivity.
- c) Giving reason(s), suggest which of the above metal(s) can be used to make a tank for storing water in your school.
  - i) Metal(s)
  - ii) Reason(s)

**141.** Ethanol is an organic compound that belongs to a homologous series of compounds called alcohols, having the general formula  $C_nH_{2n+1}OH$ , where  $n \geq 1$ .

a. Write the molecular formula and the name of any other **two** members in this homologous series.

Molecular formula	Name

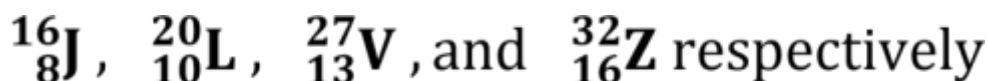
b) Ethanol may be used as a fuel. Write a chemical equation for the complete combustion of ethanol.

c) Describe how each of the chemical products of the reaction in (b) can be tested in the laboratory.

**142.** (a). Mukwano bar soap is one of the soaps that can be prepared by boiling palm oil and a substance Y and after which sodium chloride is added to the boiled mixture. i) What is the role of sodium chloride? ii) What name is given to the process leading to the formation of soap?

b) Water collected from the borehole (**T**) and also that freshly harvested in tanks from rain (**Q**) can be used to wash clothes with the help of soap. One of these two (**T** or **Q**) requires more soap to form lather. i) Which one of the above requires more soap to lather? ii) Suggest what can be done to the water in (i) above such that it can also requires less soap to lather.

**143.** The full symbols of atoms of elements **J**, **L**, **V**, and **Z** are



a. Which one of the above elements is a noble gas?

b. (i). State **two** elements that can react together to form a compound which is a solid at room temperature, soluble in water and can conduct electricity when it is only in molten form or aqueous state and not when in solid state.

(ii). State the reason why the compound formed by the elements in (i) can only conduct electricity in molten form or aqueous state but not in solid state.

c. State **two** elements which can react together to form a substance which is a gas at room temperature

**144.** Most of the youths in Kampala depends on the fast foods prepared by peasant ladies for breakfast and lunch. They say the food has a nice aroma, the food can stay for some time when kept hence attracting them. On a certain day one the youths got stomach upset and decided to use paracetamol tablets for relief.

**TASK:**

Use your chemistry knowledge to; Explain

- (i) Categories of the products used.
- (ii) The suitability of the products.
- (iii) What are the side effects of using the products?
- (iv) How can these side effects be mitigated?

**145.** Ntakirutimana was sent to buy paraffin from a nearby petrol station. On reaching home a young sibling of Ntakirutimana thought it was water and poured it in the jerry can containing some water. He realized that he has to take the paraffin to the mother who wanted to use it for cooking in the stove. The mother realized that the paraffin had water.

**TASK;** As a chemistry student;

- (a) Explain to Ntakirutimana how the paraffin can be recovered from the water.
- (b) Show the difference between the paraffin Ntakirutimana got from the petrol station and the paraffin He took to mother.
- (c) Give the impact of using the paraffin to the environment.

**146.** Recently there is a lot of metal fabrication workshops which has provided youths with jobs. In these workshops, they mainly use metals made of iron and this has led to scarcity of iron. Government in response decided to give a local investor to set up an iron production plant in Lira where the materials needed to make iron were recently discovered. However, the community is concerned about its environmental effects, how they will benefit from the plant and how the process will occur.



The head of department chemistry has appointed you to sensitize the other learners.

**TASK; Prepare a presentation you will make during the meeting.**

**147.** Due to improved standards of living most people in Kasese district have resorted to building their own houses. Most of the materials required to build are present but there is inadequate cement in the hardwares in the place. In Kasese there is all the raw materials that can be used to make cement. The local leaders decided to start up a cement factory that can solve the problem but with minimal environmental impact.



However, the science club members in your school would like to know how the process of production will be carried out.

**Task:** As a chemistry student, make a write up you will use during the presentation.

**148.** Ntandi village in Bundibugyo district is found at the foot of Mountain Rwenzori and in Ssemuliki forest. People in this village mainly they get income from charcoal burning, rearing of goats and cocoa growing. Recently there is a dry season and when it rains there is a lot of floods in the area, this has led to the goats dying, loss of property due to heavy floods and the Ssemuliki river where they get water for domestic use have started to dry up. The illiterate locals are now wondering why all these are happening even some of them are saying their village is be witched.

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A sensitization week is to be organized in the village to explain the existing situation. The government officials have decided to use the theme “My forest my responsibility, my River our responsibility.

**Task ;** As a chemistry student, write a message you will deliver upon invitation.

**149.** During his free time, Mutebi decided to visit the Chemistry Laboratory at their school with rock salt (commonly known as “Ekisula” in Luganda). Upon reaching there, he added water to the rock salt, stirred the mixture and common salt was able to dissolve forming a solution while the impurities which were insoluble remained.

**Task:** As a chemistry literate,

(a). Cite the name of the technique Mutebi would employ to obtain pure common salt from the above extract.

(b). Generate the principle behind the technique cited in (a) above.

(c). Help Mutebi to come up with the chronological steps he would follow using the above cited technique in order to come up with pure sodium chloride at the end of the experiment.

**150.** While in class, Edward attentively listened to their Chemistry teacher as he explained about the formation process of rocks. In his explanation, the teacher explained that plants, water, wind and change in temperature can all contribute to soil formation. This information however proved to be sketchy and left Edward staring at all the colleagues in class.



Edward only believes that it is change in temperature that can contribute to soil formation and he has decided to approach you for further explanation in absence of the teacher.

**Task:** As a wise chemistry student that understood the chapter of rocks and minerals:

(a). Explain to Edward how plants, water and wind can contribute to soil formation.

(b). Further help Edward to identify the various rock types that exist in nature and how each of them is formed.

**151.** One of the main reasons for carrying out a chemistry scientific investigation in the Laboratory is to come up with empirical evidence on how certain chemical processes end.

However, the task is not an easy one as it involves a number of steps one should follow in order to come up with the final findings. Each of these steps is pivotal and has a number of importances in general. Most of your fellow students have found a challenge in identifying the purpose of each of the steps.

The Dean of Sciences in your school has chosen you to expound more about the matter to your fellows.

**Task:** Prepare a mind map that you will use while making your presentation to the plenary.

**152.** Uwimana is a student at Emma high school in bushenyi. In one of the chemistry lessons he missed, their chemistry teacher explained about Electroplating and how important the process is. In his explanation, he used a five hundred shillings coin and a one hundred shillings coin, both of which he connected to the terminals of the cell and left the completed circuit to settle for about 10 to 15 minutes. At the end of the experiment, the five hundred shillings coin had reduced in size and the one hundred shillings coin became tinted with a brown colour. The challenge Uwimana has got is that he has failed to understand how this process occurs and its applicability in the daily life.



**Task:**

As a chemistry student that understood the concept, write a message you will deliver to uwimana.

**153.** The Uganda Civil Aviation Authority has hired an engineering company to reconstruct the recently damaged bombardier aircraft body. The chief engineer of the company wants to reconstruct a new, good and strong bombardier aircraft body.



However the chief engineer knows that he has to choose the right material to be used with suitable qualities and properties and thus he has come to you for advice.

**Task:** Use your chemistry knowledge to;

- (a) Explain
  - (i) The category of the material the engineering company will use
  - (ii) The suitability of the material
- (b) The impact of the material to the environment.

**154.** Ammonia is used on a large scale to manufacture fertilizers which are highly needed by the farmers. In an attempt to continue supporting the country's agricultural sector. The government is seeking to ensure a steady availability of ammonia and thus has hired an investor to set up an ammonia production plant with minimal environmental impact in Kitambala town.

However the town community would like to know how the production process will be carried out and how will they benefit from this plant.

**Task:**

As a chemistry student, make a write up you will deliver during presentation.

**155.** 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.

As a chemistry learner, prepare a short message you will deliver upon invitation to the Workshop.

**156.** Abiti and Auma were both suffering from a sickness and Auma was also feeling a headache. They were both diagnosed with a certain bacterial infection and thus they rushed to a pharmacy where Abiti bought a certain medicinal drug and his sickness later healed, Auma bought another type of medicinal drug but only the headache healed and the sickness persisted.



**Task:**

As a chemistry student;

- Identify the categories of the drug products used by Abiti and Auma.
- Explain to Abiti and Auma the dangers associated with the drug products.
- Evaluate the products used by Abiti and Auma.

**157.** While investigating the reaction of period 3 elements with water, Juma first considered two elements **A** and **B** and the results of their reaction with water is summarized in the table below.

Element	Observations
<b>A</b>	Reacted violently while floating on surface of cold water forming an alkaline solution with evolution of hydrogen gas.
<b>B</b>	Reacted slowly with cold water forming an alkaline solution and hydrogen gas but when heated with steam formed a white solid and hydrogen gas

**Task:** As a chemistry learner;

- Give the category of elements **A** and **B**.
- Predict the reaction of other elements in period 3 with water.
- Advice Juma about the dangers associated with the reaction of these elements with water.

**158.** One of the large scale use of Sulphuric acid is to manufacture paints. Due to increased demand of paints countrywide, the government is seeking to ensure that there is a steady supply of Sulphuric acid to be used to manufacture the needed paints. The government has hired an investor to set up a Sulphuric acid manufacturing plant in Kimu town.



#### S.4 CHEMISTRY SCENARIO COLLECTIONS EDITION 2026

The locals of Kimu town are concerned about how the production process will be conducted, its environmental effects and how will they benefit when the plant is constructed in their town.

#### Task:

Prepare a presentation you will make answering concerns of the locals.

**159.** Rocky ores found in Kiremu district are found to be rich in iron, a mineral used to make steel bars. The government has cleared a local investor to set up an iron extracting plant to extract vast quantities of iron from the rocky ores with minimal environmental impact. However, due to inadequate resources, the local investor has promised to first extract the iron in its impure form which the government accepted.



The district officials would like to know how the extraction process will be conducted and how the plant will impact their area.

#### Task:

Prepare a short message you would tell one of the officials concerning the plant.

**160.** Kawuki lives along the channels of a water body which supplies the entire village of kajabijo with water. He has many cows which drink and move within the water body. He has a big plantation of crops next to the water body on which he uses a massive amount of fertilizers to ensure that he get high yields. He normally cools his machines in water and his wife earns a living by washing clothes daily for people in kajabijo. The wife uses detergents and soap to wash the clothes.



**Task;** Write a piece of advise to Kawuki letting him know about the ways his family and activities pollute the water body, the possible effects the pollution could do to kijabijo and how he can participate in solving the problem of water pollution in the area.

**161.** An agribusiness company in Uganda organized a washing competition which was held in Walukuba division, Jinja district in order to evaluate its products. Two ladies were each provided with a full jerry can of borehole water, a basin and a stained cloth. One lady was provided with detergent **A** another with detergent **B**. Mrs. Menha, the usual annual winner of the competitions used detergent **A** to clean the cloth but it remained with some dirty marks even after rinsing it several times. Mrs. Kirunda used detergent **B** and won the race as she cleaned the cloth with one rinse. Mrs Menha was frustrated and could not understand what went wrong this time round.

**Task;**

- a) As a chemistry learner,
  - i. Explain categories of products, **A** and **B** used by the two ladies.
  - ii. Help Mrs. Menha to understand how the product works.
- b) Advise the two ladies on the challenges associated with the use of the products.

**162.** A boy's father died before completing the construction of their house. Mainly doors and windows are missing, so Peter is in the process of making good and strong window and door frames for this house without affecting the environment. He is aware that there are various materials on the market for making window and door frames. He also knows that in order for one to produce good quality frames and windows; he should select the right material with suitable qualities and properties. However, he is still confused with the choice and has approached you for some advice.

**Task;** Use your chemistry knowledge to:

- a) Explain
  - i. The categories of the materials.
  - ii. The suitability of the materials.
- b) Advise Peter on the choice of the materials.

**163.** People in most remote villages of Uganda often suffer from scarcity of some synthetic products. Sometimes their only available suppliers hike prices for these products. A women's group in Kisoga village, Mukono district is planning to manufacture a soapy detergent as a new business project to reduce on their expenses and to increase their annual gross sales. The group is planning to set up a soapy detergent production plant with minimal environmental concerns in this village.

Some locals of this village are also complaining that their valuable land is about to be taken up by these women in order to set up their production plant. However, the science club members in your school would like to know how the process of production will be carried out.

**Task;** prepare a write -up to would use to sensitize the club members

**164.** Air is a mixture of different components. It contains 21% oxygen. Due to a wide spread of respiratory illnesses caused by COVID-19, there was an increased demand for oxygen by patients in hospitals. The government supply of oxygen is not enough and is planning to set up an oxygen production plant with minimal environmental impact.



However, the science club members in your school would like to know how the production process will be carried out.

**Task;** As a chemistry learner, prepare a write up you will use during the presentation.

**165.** People of Kigaragara village in Isingiro district can easily cross into Tanzania for charcoal business. Due to increase in population of this district, many natural forests have been cleared to provide charcoal for use as fuel and natural swamps have been reclaimed to create space for settlement. These happenings have left the district officials wondering. As a result, the government through the district officials is planning to create awareness to the people in Isingiro District through sensitization workshops organized in different villages.

**Task;**

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

**166.** Kagulu village in Buyende district is developing at a faster rate. Many of the recently existing swamps and forests are now filled with buildings. Stone quarrying is the order of the day among most the locals in the village. Recently the wells have started drying up and yet the little water available is not fresh. The few residents that practice crop husbandry also say that seasons have changed and this has caused famine in the area. All these happenings have left many of the residents wondering.

A sensitization workshop is to be organized in the district by the government through National Environment Management Authority (**NEMA**).

**Task;**

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

**167.** Semuku staying deep in a village is well known for his perfect Agricultural practices. He keeps poultry and goats on a large scale which made him earn an income worth 10 million shillings in the month of June, 2024. He has always loved to stay in town and so on receipt of the money, he run fast and he was able to buy a small plot of land in Kampala city, Where he is residing now. Semuku loves Agriculture so much and he wants to set up a poultry farm on his new plot in town but he lacks knowledge of using small piece of land as he has been used to free range system of poultry rearing in village.

**Task.** As a chemistry learner with the knowledge of Materials,

- a) Explain to Semuku on the categories of the materials he will use to set a strong poultry farm without affecting the environment.
- b) Describe to him the suitability of the materials chosen and how he can use the materials to set up the farm.
- c) Evaluate the choice of the materials chosen.

**168.** Some people living in rocky area are poor because crops cannot grow well. They have decided to relocate to another area but the area Member of Parliament (MP) has organized a sensitization workshop on the other ways they could make use of the rocks.

**Task**

As a chemistry student, you have been selected to advise the people of the area. Make a write up you would present to the people.

**169.** 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 with a challenge of low water quality. The chairperson of Nkondo village has organized an

emergency meeting with a theme "WATER CONSERVATION IS EVERYONE 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.

**170.** The government plans to build a new oil refinery in the Kadam-Moroto Basin to exploit the natural resource and reduce on fuel prices. However, there is need to educate local residents about the natural resource, its environmental impact and importance first. The science club at your school has volunteered to do the sensitisation during holidays.

**TASK;** Write the chemistry you would need to pass over to the residents.

**171.** The scenic beauty of Uganda's rocky landscapes attracts tourists but also but also sparks concern about environmental degradation as a result of human activities such as stone quarrying which release chemicals and dust in air and water. Many communities have failed to find a balance between enjoying the benefits and the environmental impacts.

**Task**

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

**172.** Mabira Forest in Uganda has provided yet another most recent economic activity. Felling trees (cutting down of trees) for burning charcoal!. Deforestation for sustenance is illegal / a vice that needs quick condemnation. Although the name practice above is bad and must be protested, many are able to gain income and provide for their families as they continuously gain profit.

**TASK**

As a young scientist who has loved nature and who prefers to conserve environment, prepare a report that you would share with the fellers in Mabira, about other carbon-based fuel that they can resort to other than charcoal burning.

NB: In your report, talk about dangers related to burning of charcoal/ dangers associated with deforestation.

**173.** Kisoro rocky hills in southwestern Uganda depend on stone quarrying as a primary source of livelihood. However, extensive quarrying has resulted into seasonal changes, water shortage, and reduced air quality and water contamination.

Basing on this background, the government wants to make a sensitization about the issue

**Task**

As a chemistry student, write a message that the government would use in the sensitization

**174.** Lake Victoria has been encroached due to increasing population. National Environmental Management Authority (NEMA), wishes to raise public awareness among Ugandans on the matter.

The science club at your school has selected you to give a presentation on the occasion. On theme "SAVE WATER BODIES"

**Task:** As chemistry student, write a message you will deliver upon invitation.

**175.** Due to increased industrialization and settlement in towns, there has been an increased destruction of natural resources and this has attracted attention from National Environment and Management Authority (NEMA). There is a plan to make a sensitization countrywide.

**Task**

As a chemistry student, make a write up to sensitize your community about the matter.

**176.** Natural resources have been over exploited which has led to environmental degradation due to increasing population and human activities as bush burning and charcoal burning. This has attracted the attention of the environmental awareness club in your school and National Environmental Management Authority officials at large. The club and the officials are planning to sensitize the entire student community in the school on an assembly. You have been appointed on the behalf of senior four students to address an assembly.

**Task:** As a student of chemistry, prepare a write up you will deliver during that time.

**177.** Charcoal is a fuel used in most homes throughout the country. The Uganda parliamentary caucus environment is however always against the business basing on how charcoal is made and its effects on the environment. This has attracted attention of officials of National Environment Management Authority (NEMA), one of the government Agency. The officials are planning to create an awareness to the people of the country through sensitization workshops organized in different districts in Northern Uganda.

**Task:**

As a chemistry learner, prepare a short presentation you will deliver during the workshop upon invitation.

**178.** Fresh water bodies like lakes and rivers have been heavily encroached on as a result of increasing Uganda's population. Many people have cleared all the vegetation around the lakes to set up buildings and beaches. Many industries are dumping their waste products in these water bodies. Fishermen are on the other hand using poor method of fishing ending up killing

other species in the water. On this year's World Environment Day, the science club in your school wishes to raise public awareness among the entire student's community on the matter.

**Task:** The science club at your school has selected you to give a presentation on that day following the theme "SAVE OUR WATER BODIES"

**179.** People of Buwenge village in Jinja district for the last three years have been practicing charcoal burning in the forests and swamp reclamation. This is done in an effort to carry out animal husbandry, crop husbandry and also have land for settlement. Recently the National Environment Management Authority (NEMA) has given an order to stop all the practices taking place so as to avoid the negative impact on the environment.

A sensitization workshop is to be organized to explain the existing situation in the village. The theme of the work shop is MY ENVIRONMENT MY RESPONSIBILITY.

**TASK ;** As chemistry student, write a message you will deliver upon invitation.

**180.** In Uganda there are many mineral reserves and rocks. Due to the rapid population growth, their exploitation is causing proportional environmental degradation. The government through media houses wants to make public awareness on the matter. Your school has been chosen to lead the environmental conservation campaign in your district. You have been chosen to present one of the radio talk shows trusting your chemistry knowledge.

**TASK ;** As a chemistry student, prepare a short presentation you will deliver during the talk show.

**181.** Fresh water bodies like lakes and rivers have been heavily encroached on as a result of rapid urbanization. On World Environment Day, the Ugandan government, particularly the National Environmental Management Authority (NEMA), wishes to raise public awareness among the citizens.

The science club at your school has selected you to give a presentation on the theme "fresh water is a basic necessity".

**Task;** Write the presentation you can use.

**182.** People of Kigaragara village in Isingiro district can easily cross into Tanzania for charcoal business. Due to increase in population of this district, many natural forests have been cleared to provide charcoal for use as fuel and natural swamps have been reclaimed to create space for settlement. These happenings have left the district officials wondering. As a result, the government through the district officials is planning to create awareness to the people in Isingiro District through sensitization workshops organized in different villages.

**Task;**

As a chemistry learner, prepare a short presentation that you will deliver during the workshop when invited.

**183.** It has been observed that there are more people suffering from asthma and other respiratory diseases in densely populated towns and cities due to pollution by a number of activities but the community does not know what to do.

NEMA has organized a workshop on the theme "improving the quality of urban environment is every body's responsibility".

Your school has been invited to make to make a presentation in the workshop and you have been chosen as the presenter.

**TASK:** Prepare a message to be delivered.

**184.** In Hima village, Kasese District, most people survive on charcoal burning, animal husbandry, crop husbandry, stone quarrying among others. Some have small mills to process rice, maize, millet among others. Currently the crops are drying up, animals are dying, and wells are drying up.

Yet the little water that is available is also not fresh. These happenings have left many of the villages wondering why. A sensitisation workshop is to be organised to explain the existing situation in the village. The theme for the workshop is "BECOME PART OF YOUR ENVIROMENT"

**Task:** As a learner of chemistry, prepare a message you will deliver during the meeting upon invitation.

**185.** Uganda has substantial natural resources including forests, lakes and rivers, rocks, mineral deposits such as copper, limestone and gold. Due to the increasing population and human activities the resources are being exploited which has led to environmental degradation. The world life club is planning to create awareness to the people around the school through a sensitization workshop organized by the chairperson L.C.3

**Task**

As a chemistry student, prepare a presentation you will deliver during the workshop upon invitation.

**186.** River Kafu is located in western Uganda. People living around this river survive on sand mining, crop husbandry, animal husbandry and brick making. Of recent, the water levels have seriously reduced and sadly, even the little water available is polluted. The fish is dying. These existing situations have left the local authorities very worried. The town mayor has called for a workshop to sensitize the local community on the existing situations around the river. The theme of the workshop is "SAVE RIVER KAFU"

**Task ;** As a Chemistry student, write a message you will deliver if you were invited for the workshop.

**187.** Stone quarrying is one of the key extractive economic activity in Buntaba village in Buikwe district; supplying stones to the construction industry. People of this village for a long time practiced other economic activities like charcoal burning, crop and animal husbandry, yet the village is over populated. The environment has started experiencing environmental changes in the climate, soil erosion, poor air quality and the little water available is undrinkable. The locals are now wondering why all these are happening and some has started attributing it to witchcraft. The chairperson LC5 has organized a sensitization workshop to explain to the locals the existing situation. The theme of the workshop is MY ENVIRONMENT IS MY RESPONSIBILITY.

Task ; As a chemistry student write a message you will deliver upon invitation.

**188.** The setup of crude oil mine in Hoima district resulted in displacing of residents to other places but the displaced people are still not contented. This has made the government to intervene.

The government is planning to sensitize the residents through workshops in the district.

**Task:**

As a chemistry student prepare a short presentation you will deliver during the workshop upon invitation.

**189.** In Masese Division Jinja city some residents near the lake are involved in certain activities like raring animals, growing crops, distillation of ethanol and washing clothes from lake banks. Recently it has been discovered that the fish has started dying and people who use the water for bathing develop rashes. This has attracted the attention of officials of the ministry of health and have been invited for discussion to try and discover the causes of what is happening. A sensitization workshop is to be conducted to explain the existing situation in the area. The theme of the workshop is MY ENVIRONMENT MY RESIPONSIBILITY.

**Task:** As a chemistry student, write a presentation.

**190.** Mbarara city's rapid urbanization and industrialization have led to the contamination of River Rwizi's water. This has posed a significant risk to the city's water supply and bacterial contaminants which threaten health of livelihoods.

The city mayor together with NEMA officials have started on the sensitization through workshops organized in the different communities.

Your school has been invited since its part of the community and you have been selected to represent the school.

**Task:**

As a learner of chemistry, make a write up of the message you will deliver during the workshop.

**191.** In Uganda, there are lots of valuable minerals and rocks, but their excessive mining is harming the environment. The government wants to raise awareness through media about this issue. Your school is one chosen to lead the sensitization campaign in your district with the theme: "THE IMPACT OF MINERAL MINING."

As a chemistry student, you are chosen to talk about it on a radio show, using simple chemistry terms.

**TASK.** Write down the information which can be conveyed.

**192.** The National Environmental Management Authority (NEMA) in Uganda is gearing up to sensitize citizens about the importance of conserving natural resources, particularly focusing on the impact of human activities on fossil fuels, in honor of World Environment Day.

As a science student in secondary school, you've been given the role of organizing a special assembly to educate the fellow students about the significance of fossil fuels and the importance of their conservation.

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

**193.** 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

**194.** A team of archaeologists from Makerere University, just discovered sample remains of human skeleton that was buried under the rocks in Mount Elgon Eastern Uganda. According to the preliminary reports, it shows that the remains contain traces of carbon - 14 isotopes after the analysis.

However, the team leader wants to know how old is the skeleton containing 6.25% of carbon - 14 if its half - life is 5730 years and danger of the process responsible for the decay in nature. You have been asked to give assistance.

**Task:** As a chemistry student:

- a) Identify the type of nuclear process that took place.
- b) Determine how old is the skeleton containing carbon - 14
- c) Suggest the side effect(s) of the whole process with mitigation.

**195.** 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 an industry that makes soapless detergents in the area however he is facing resistance from the community members about the issue of starting up the factory and he is equally lacking knowledge about the manufacturing process.

The head teacher has appointed you to go and represent the school in the meeting organized by the chairperson of the area to settle the wrangles between the investor and the citizens of the area.

**TASK.** Write a message you would deliver in this meeting.