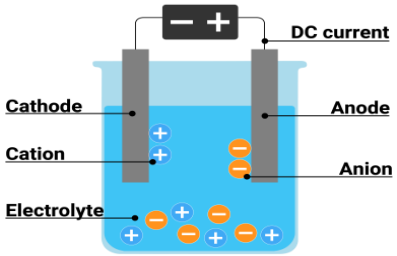
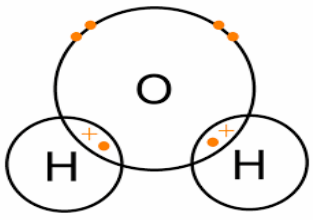
# S.4 CHEMISTRY SCENARIO COLLECTIONS 2024

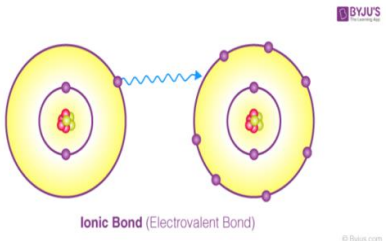
**1**. Cement was first produced by Joseph Asp din in England in 1924. He was a brick layer and inventor of modern Portland cement. However, research has confirmed that Lime and Cement production has undergone tremendous development since its beginning, some 2000 years ago and now so many different types of cement are being produced to market. Thus this has enabled progressive urbanization from the local soil built houses to cemented brick houses. And so cement is an important chemical in most societies.


(a) Construct a flow chart to indicate the process involved in the manufacture of cement.
(b) Identify the social benefits of manufacturing lime and cement.
(C) Explain some of the dangers to the community, arising from the manufacture of lime and cement.
(d) Ngambo, a villager from magogo village 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**. 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.



(a) As a chemist, explain what happened causing the laptop to blow.
(b) Suggest any two other properties of the type of compounds to which the compound that melted easily belongs?
(c) Using the outermost shell electrons only, show how the compound that caused the laptop to blow up is formed.

**3.** In the school laboratory, students were investigating the nature of solutions obtained from different fertilizers used by Muwangi residents by identifying their pH values. The residents had complained about poor yields of their crops yet they had used some fertilizers constantly. The results obtained were recorded in the table below.

| Solution | V | W | X | Y | Z |
|---|---|---|---|---|---|
| pH Values | 8.2 | 7.0 | 2.0 | 11.2 | 5.6 |

a) Classify the fertilizer solutions above depending on their nature.
b) Name the ions that determine the pH values of fertilizer solutions V and X.
V: ……
X: ……
c) During the investigation, sodium carbonate was added to solution X and Z. The students observed that solution X liberated more effervescence than solution Z. As a chemistry student explain the Observation. (Include the equation for the reaction)

**4.** 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.

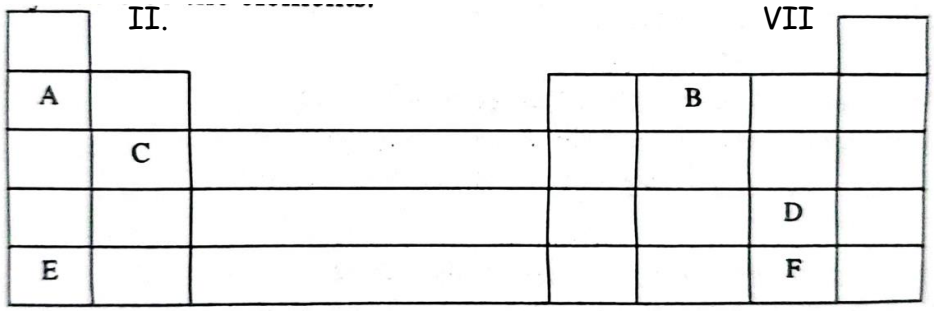



*Table 5.4*

Mudhiba was puzzled on what the drawing represented and what the letters A, B, C, D, E, and F were representing.
a) As a student who has studied senior two chemistry,
i) Assist the Mudhiba to know the nature of elements A, E and C. Give a reason for your answer.
ii) Advise the Mudhiba on how to call elements D and F and give him the trend in their reactivity.

b) Assist the Mudhiba to know the conditions required for elements E and C to react with water.
i) Element E: …….
ii) 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.

**5**. 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.

**6**. 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.**

**7**. At Katosi landing site, residents use Lake Vitoria as their main source of water which provides water that is not clean enough for use. The leaders urged the government to set up a treatment plant in order to provide safe water. However, leaders were requested to employ a skilled resident who is acquainted with how water is made safe for use, stages involved in purification and the challenges the project may face in the town.

**TASK:**
As a chemist, provide the residents with the information they need to be employed.

**8**. The president of Uganda wants to donate fire extinguishers to schools to reduce on the dangers associated with the fire out break but the carbon dioxide produced locally is not enough to support the program. He is looking for an investor to set up carbon dioxide processing industry in Kakira in Jinja district. Advise the investor.

**9.** A farmer in a rural area cleared his land to grow maize for sale. The rainfall was very favorable but the yields were very poor because the soil was not fertile and he made losses. He was advised to buy and apply one of the ammonium fertilizers. Make a presentation of about 400 words to guide him. (C=12, O=16, S=32, P=31, N=14, H=1)

**10.** The quality of air, water, and soil has always changed over time in your district. The chairperson LC V of your district is so much concerned with the changes observed. Make a write up to make people in your district to be aware of what is happening.

**11**. Most of the youths in Muwangi village in eastern Uganda are involved in cutting trees, burning the wood and the final products for cooking. Residents are frustrated with toxic fumes from the activities. They are curious and beseech to know the nature and composition of the product and why the activities.
The chairperson has contacted you as a chemistry learner for guidance on what she is about to communicate in the community meeting.


**Tasks;**
(a) Guide the chairperson on
(i) Nature of the product.
(ii) Composition of the product.
(b) Her concern is " can these activities have any impact to their community?" if so can this impact be reduced? Advise her
(c) "Can the product benefit the residents?" Take her through

**12.** 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?

**13.** 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 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.

**14**. 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.

**15**. A resident of Bufunjo zone fetches water daily from two sources of water: borehole and nearby spring. When she uses this water from these two sources, she realized that she uses a lot of soap while washing her clothes. One day she boiled the water from the borehole for bathing but remembered that she had not washed one of her shirts and washed it with the boiled water instead and used little soap than it used to be. This has forced her to try boiling the spring water as well and used it for washing her clothes but still used a lot of soap as it used to be. This has confused her more.
**Task.** Prepare an article to clear away her dilemma.

**16.** 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.

**17.** 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.

**18.** 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.

**19**. 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. 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.

**20**. 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.

**21.** 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 massage you will deliver upon invitation

**22.** Bakaita Godfrey always washes his clothes at any time and they can get dried at any time whether on a hot day, inside the house or even on a windy day.
(a)Explain why clothes dry,
(i) On a dry day
(ii) Inside the house.
(iii) On a windy day.
(b) i) From the knowledge of different states of matter, explain the process of rain formation.
(ii) State any three importance of water to man.

**23**. Chemistry has contributed to the society both positively and negatively.
(i) Explain any five ways in each case in which chemistry has contributed positively and negatively to the society.
(ii) Identify any five sectors where chemistry plays an important role in the economy of Uganda.
(iii) Name any five products used in our day to day life obtained from the knowledge of chemistry.

**24**. In your village you have challenge of water, where the wells have muddy water and the boreholes provide salt water that hardly quench their thirst but rather increase it. Describe any scientific procedures that you as chemistry student can perform to make the village water clean and safe for human consumption

**25**. Polythene bags, car tyres, buckets, iron sheets and petrol are some of the materials used in our day to day life.
(i) Describe any five ways how polythene bags are dangerous to our environment.
(ii) Explain any five ways of how to prevent the effects of polythene bags on the environment.
**26.** State how the following chemical processes have contributed to our country.
a) Manufacture of cement
b) Manufacture of Sugar
c) Sewage treatment d) Manufacture of fertilizers

**27**. Explain the following observations by using the idea of moving particles

a) Wet clothes hanging on a line become dry even in cold weather

b) If you put some sugar in tea, the tea will become sweet even when you don't stir.

c) If you place a balloon over the top of a test tube that contains water then you heat the water, the balloon blows up.

**28.** A group of S.1 students at Riverside college Tirinyi carried out an investigation to find out what happens to materials when hammered and heated. Study the table below fill answers to the questions.

| Material | Observation when hit with a hammer | Observation when heated |
|---|---|---|
| a. Wood | | |
| b. Glass | | |
| c. Concrete | | |
| d. Metal | | |

**29**. Argon, oxygen and nitrogen are obtained from air by fractional distillation of liquid air at - 2500C where liquid air is warmed up and the gases are collected one by one.

a) State whether liquid air is a mixture or a pure substance?

b) Explain why fractional distillation is used instead of simple distillation. (11 2 c) During the distillation, nitrogen gas is obtained first then argon and oxygen. Explain this phenomenon.

d) Name the gases which are not collected through the fractionating column during the above process.

**30**. i) Define the term air pollution.

ii) Name any 4 sources of air pollution you know.

iii) State any two gases that are produced by car engines that act as pollutants

**31**. 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

**32**. i) State the difference between a radical and an element.

ii) Name any two examples of radicals you know.

**33.** a) What do you understand by the term "rocks"?

b) Mention any three importances of rocks to the economic development of a country like Uganda.

**34.** Classify the following statements as TRUE or FALSE.

a) Digesting sugar with the amylase in saliva is a chemical change

b) Electro planting a metal is a physical change.

c) All physical changes are reversible

d) All the chemical changes are irreversible.

**35.** i) Describe what an acid is?

ii) Name the acid found in the following substances.

i) Tea …… iii) Urine …… ii) Lemon Juice ……

iv) Digestive juice in stomach……..

**36.** 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 flow 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

**37.** a) Name five sources of natural water.

b) Describe the process of purification of the tap water that we normally receive in our communities

c) Explain how natural water is recycled

**38**. Look at the chemicals listed below and answer the questions about them. You can use the table below showing the periodic table to help you.

Iron, Water, Sand Oxygen Gold Carbon dioxide Helium Carbon Rust Sea water

a) Name the two metals

b) Name two compounds

c) Name a mixture

d) Name a non-metallic element that is a solid

e) You have a solution of sugar in water. You want to obtain the sugar from it

i. Explain why filtering will not work

ii. Which method will you use instead?

f) How would you separate salt and sugar?

g) Mention any special safety precautions you would take

h) Differentiate between mixtures and compounds

**39**. a) What is a rock?

b) i) Name three types of rocks

ii) Describe the formation of the named rocks above.

**40.** 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..

**41**. 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 hip of ash with very little pieces of charcoal, not strong enough like what his neighbours make.
As a friend to Jimmy who understands the process of charcoal making, write a letter to advise him on how to make charcoal.

**42**. Read carefully below about how members of Sarah's family started their day.
Sarah woke up one day late than usual. She was hearing her mum's loud voice telling her to make tea. When she moved out of the bed, she met her younger brother who was so dirty after playing in mud earlier morning. She removed his dirty clothes and washed them using detergents. She also bathed her young brother using a bathing soap. As she was moving to the kitchen, her father called her and asked her to clean her shoes. She polished her father's shoes using a new shoe polish they bought from the market. She then went to the kitchen in order to make tea in the kettle. She observed bubbles of boiling water which produced steam in the kettle. She then added tea leaves which change the entire color of hot water. She tested the tea but it was so bitter. She then added sugar which made the tea sweet. She poured the tea in the flask and took it in the leaving room where she saw her mother putting fruits and soda in the refrigerator. She started feeling headache. When her mother knew about the headache, she gave her pain killer tablets which made her feel better after a few minutes. She moved out of the house and saw their neighbor painting his old metallic door which had developed a brown coat.

a) Outline activities at Sarah's home showing chemistry. Give all

i) Identify the occupation

ii) How is the knowledge of chemistry used in that occupation?

iii) How is the activity above useful to the society?

**43**. 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 term conditions for the reaction?
(d) Write the formulae of the products of each of the changes

**44**. 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.

**45**. 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.

**46**. A group of students went for field study in one of the largest limestone quarries in Tororo, Eastern Uganda. Limestone issued 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.

**47**. 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?

**48**. 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.

| Metal | Reaction with water | Reaction with steam |
|---|---|---|
| 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?

**49**. 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) Nametheprocessbywhichpassionfruitseedsareseparatedfromthemixture
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?

**50**. 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?

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

| substance | Melting point($^oC$) | Boiling point($^oC$) | Density ($g/cm^3$) |
|---|---|---|---|
| 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

**52**. A small river called Nyagak passes through the rural farming communities of Alur and Madi into river Nile, in north western Uganda. On analysis the water downstream was found to have unsuitably high levels of nitrates after passing the Alur and Madi communities.

a) (i) What practice leads to high levels of nitrates in the area.

(ii) How do the nitrates form distant communities reach the water sources?

b) What alternative material can be used by the communities to lower the nitrate levels? Explain why.

**53**. A student found a container of Hand sanitizer with a label shown below:

| **KLINN HANDSANITIZER**<br>**Effective on common germs**<br>**Active component: absolute ethanol**<br>**Other components: water and Glycerin** |
|---|

a) State one use of hand sanitizer

b) Explain why the liquid is not regarded as a pure substance

c) Explain why the liquid is thick and less viscous

d) Describe a practical method that could be used to separate the components the hand sanitizer?

e) Describe a chemical test that can be carried out to show the presence of water in the hand sanitizer

f) Explain why it is not advisable to keep a hand sanitizer near a source of fire.

**54**. 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 $CH_4$. The amount of energy released by the complete combustion of 1mole 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 or water from $25^0C$ to $60^0C$(Specific heat capacity of water=4.2Joules/g/K, density of 1g/cm3)

(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 KJ/mole )

(iii) Which one between one between ethanol or methane is a more effective fuel and why?

**55.** 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.

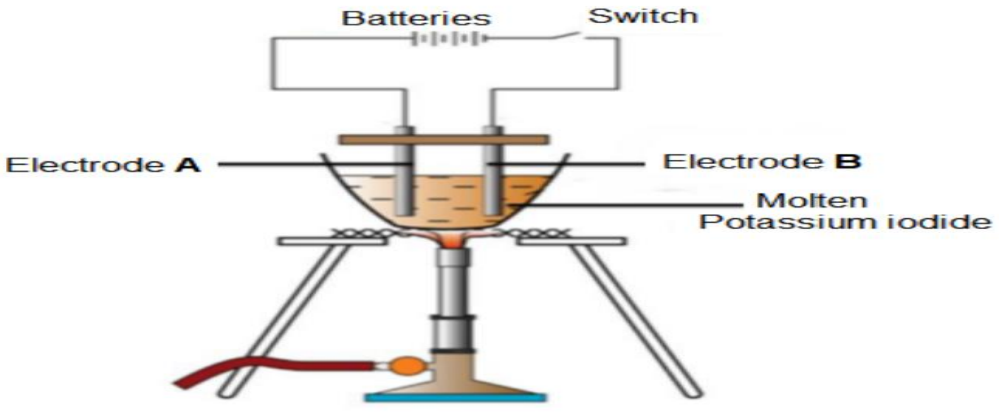
b) Copy and complete the table below showing the percentage of each ingredient in the concrete mixture.(Give your answer to the nearest whole number)

| 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?

**56.** A scientist discovered potassium metal by carrying out electrolysis of molten potassium iodide. Small, shiny beads of molten potassium were produced when an electric current from a battery was passed through molten potassium Iodide using graphite electrodes. The electrolytic cell is shown in the diagram below.



a) Name the electrodes A and B

b) Explain how the potassium metal and all other products were formed during the electrolysis. Use equation to justify your explanation.

c) Explain what would happen at the electrodes if 1.0M potassium iodide solution at 25°C was electrolyzed instead of the molten one using graphite electrodes.

d) Many other metal elements such as aluminum are extracted from their ores by electrolysis. Using a named ore of aluminium, describe its process of extraction from the named ore.

**57**. What term can be used to describe the reaction between baking soda and acidic liquid injected by bee sting?

a) You are given two solutions A and B. The pH of solution A is 6 and pH of solution B is 3.

(i) Which solution has more hydrogen ion concentration?

(ii)Give reason for your answer

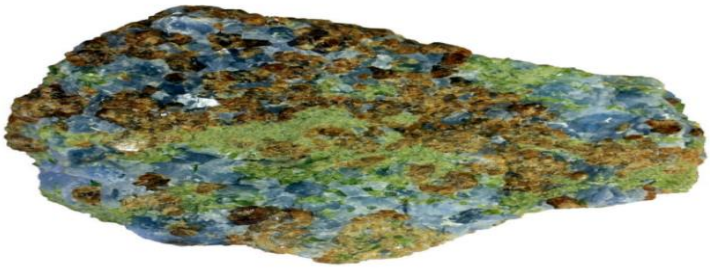
b) Explain the following:

i) Sulphuric acid is a stronger acid than carbonic acid? Use equations to support your answer

ii) Dry hydrochloric acid (HCl) gas does not change the color of the dry blue litmus paper. Use equation to justify your answer

iii) When dilute Sulphuric acid is added to zinc chloride a colorless solution is observed. However, when the dilute acid is added to calcium chloride, a white precipitate is observed.

**58.** 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= 22.4dm3 at stp)

iii) Calculate the change in mass of the copper compound.)

**59.** Charcoal burning is one of the sources of income and the main source of fuel in Uganda but recently charcoal burning has attracted a national concern where the majority of people are against it. Explain the effects of this economic activity and how it can be prevented.

**60.** People have encroached wetlands in search of land for settlement and setting up industries. This has caused major problems to the country and promoted the government to campaign against wetland encroachment.

**Task**

As a learner of chemistry, write a speech explaining to your community why the government is against wetland encroachment.

**61.** 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.

**62.** Below is an article extracted from the New Vision of 07th / May/ 2022. The website to which it was downloaded has been provided at the end of the article. Read the article carefully and answer the questions that follow. TOP STORY " Air pollution killing more than HIV" -New vision official. Gerald Tenywa. Journalist @New Vision. Every home in Uganda has either been infected or affected by HIV and AIDS. They have either lost a relative or have suffered as a loss of a bread winner. Air pollution has gone steps ahead of HIV in affecting Ugandans as it has claimed more lives than HIV, Daniel Okello , the director in charge of environment at Kampala Capital City Authority (KCCA), has said. "We lost 23,000 People in 2019 due to HIV in Uganda. In the same period, 26000 People died as a result of cardiovascular diseases linked to air pollution," he said. Okello was speaking during the launch of the air quality awareness week at the Uganda Media Centre in Kampala on 4 May 2022. The event, themed "Be air aware, be prepared" ,attracted top officials from the National Environment Management Authority( NEMA), Makerere University and Ministry of Health, who called for increased awareness and actions to curb air pollution. Okello mentioned of two types of air pollution -outdoor pollution and household or indoor pollution which are all greatest environmental threat to human health around country pointing out Kampala, Mukono and Jinja with the poorest air quality which is five times way above the critical threshold of World Health Organisation. Okello said indoor air pollution resulting from cooking with biomass fuel particularly charcoal, firewood, coal, burning of organic fuels such as kerosene, burning of grass and waste products. Partial combustion of these fuels lead to emission of carbon monoxide gas, which is poisonous if inhaled. Worse than indoor air pollution, he added, is outdoor air pollution include old cars spewing fumes. As the cars burn fuels, such as diesel and petrol to power engines, they release poisonous gases such as carbon monoxide and also lead from motor vehicle emissions, dust from unpaved roads and construction sites, factories release fumes filled with sulphur dioxide gas which leads to acid rains and carbon monoxide gas which is poisonous .Burning of wastes including plastics, produces dioxins and furans, which cause cancer.

Dr Ivan kimuli from Makerere University's lung institute said they have done studies that indicate that 11% of the population suffers from asthma and that was being aggravated by poor air quality and the same study indicated that children in rural settings had " better and less damaged lungs" than those in urban settings, who were exposed to pollutants in the air. NEMA's director for environment monitoring and compliance, Waiswa Ayazika, said: "the government is currently making a clear plan to improve air quality involving every body's responsibility to save the current and future generation."
http://www.newvision.co.ug/category/health/air-pollution-killingmorepeople-than-hiv-133316.

(a) State what is meant by the term "air pollution" ? (02 scores)

(a).State what is meant by the term "air pollution" ?
(b)From the article; state the different types of air pollution and outline how each type of air pollution is caused
(c)From the article, state the main air pollutants and show their effects to man.
(d)Suggest a reason why Kampala, Mukono and Jinja have the poorest air quality which is five times away above the critical threshold of World Health Organization?
(e)Suggest any 5 solutions that can be adopted into the government's strategic plan of how air pollution in the country can be greatly reduced.

**63.** A senior two Learner from Riverside College carried out an activity to obtain juice from a fruit.

- ✓ She cleaned the fruits by washing using clean water.
- ✓ Peeled the fruits to remove the unwanted parts including seeds.
- ✓ Placed the fruits into the blender and blend them to a liquid solid mixture Removed the mixture from the blender and filter off the solid parts of the fruits using a kitchen sieve.
- ✓ Add some water while filtering.
- ✓ Added some sugar to improve on the taste of the juice.
- ✓ Packaged the made juice into clean dry bottles.
- ✓ Gave the juice made a name.

**Tasks**

a). Identify the ways how she can improve on the quality and safety measures of the juice in terms of color, taste and stability.

b). Identify the substances that can be added to make the juice suspension stable.

**64.** In the last 30 to 40 years, plastics have taken over as replacement materials for metals, glass, paper and wood as well as for natural fibres such as cotton and wool. However, plastics such as polyethene bags have contributed significantly to household waste problem, up to 10% in some countries, and it is getting worse.

a) Outline any three advantages of using polyethene packaging

b) Explain any three ways how polyethene bags are dangerous to our environment

c) Explain any three ways of how to prevent the effects of polyethene bags on the environment

**65.** 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

**65.** 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 ($CH_4$). 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

**66.** 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 $CH_4$ 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.

**67.** Bakaki Julius loves drinking rain water because he believes it is pure water as he gets directly from the sky. However, Eric Jonathan has continuously advised him to stop taking it and instead drink water from the borehole which is hard water.

a) Why do you think Eric Jonathan advises Bakaki Julius to drink hard water?

b) Hard water is used to wash clothes more soap is required while less soap is required if rain water is used. Briefly explain this observation.

**68.** 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.

**69**. Salts are very important in our everyday lives as some of them are used in medicines, add taste to our food. Many of these salts can be prepared in the laboratory.


a) Suggest three ways in which salts can be prepared in the laboratory school.
b) Ammonium chloride is an example of the salts prepared from the laboratory. When it was dissolved in water and the solution tested, it was found to be acidic. Explain why the solution was acidic.
c) State three other applications of salts in your community

**70**. 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.

(a) Identify any three careers that you can take up through studying chemistry.
b) Briefly describe how the knowledge of chemistry has been applied in the following field in the Ugandan economy;

(i) Agriculture.

(ii) Medicine

(iii) Cosmetics industry

**71.** Read carefully below about how members of Rehema's family started their day.
Rehema woke up one day late than usual. She was hearing her mum's loud voice telling her to make tea. When she moved out of the bed, she met her younger brother who was so dirty after playing in mud earlier morning. She removed his dirty clothes and washed them using detergents. She also bathed her young brother using a bathing soap. As she was moving to the kitchen, her father called her and asked her to clean her shoes. She polished her father's shoes using a new shoe polish they bought from the market. She then went to the kitchen in order to make tea in the kettle. She observed bubbles of boiling water which produced steam in the kettle. She then added tea leaves which changes the entire color of hot water. She tested the tea but it was so bitter. She then added sugar which made the tea sweet. She poured the tea in the flask and took it in the leaving room where she saw her mother putting fruits and soda in the refrigerator. She started feeling headache. When her mother knew about the headache, she gave her pain killer tablets which made her feel better after a few minutes. She moved out of the house and saw their neighbor painting his old metallic door which had developed a brown coat.

a) Outline activities at Rehema's home showing chemistry. Give all
i) Identify the occupation.
ii) How is the knowledge of chemistry used in that occupation?
iii) How is the activity above useful to the society

**72**. 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.

**73**. 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 fertilizes 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.

**74.** Nanyonjo Zahara is a student in Buwenge College in Jinja district. When in the chemistry class, Mr. Ngambo Wilsone 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.