Candidate's Name PROPOSED **ASSESSMENT GRID** BY LUKONGE AORAN 0754 857103

Signature……

Random No.						Personal No.		

(***Do not write your school/ Centre Name or Number anywhere on this booklet)***

545/1
CHEMISTRY
Paper 1
April, 2024
2 hours

IGANGA HIGH SCHOOL
END OF TERM ONE EXAMINATIONS
Uganda certificate of education
CHEMISTRY
Paper 1
2 hours

INSTRUCTIONS TO CANDIDATES:

This paper consists of **two** *sections* **A** *and* **B.** *it has six examination items.*
Section **A** *has* **two compulsory** *items.*
Section **B** *has two parts* **I** *and* **II**. *Answer* **one** *item from* **each** *part.*
Answer four items in all.
Answers to section **A must** *be written in the spaces provided while those of section* **B must** *be written on the answer booklet(s) provided.*
Any additional item(s) answered will **not** *be scored.*

SECTION A (17 Scores)

Answer **all** *the items in this section*

Item 1

Okello had a child suffering from **Pneumonia,** a disease that is caused by bacteria. Whenever he wanted to take the child to the hospital for medication, the mother of the child insisted that there is no need because the paracetamol they had at home could be used to cure the baby. After several months of no improvement in the health of the child,Okello decided to look for help.

He was referred to you that you can give the required information because you are a SENIOR FOUR candidate with chemistry knowledge.

Task.

As a chemistry learner:

a) Point out the mistake made by the mother of the child when choosing a product to treat **Pneumonia**. **(*2 scores*)**

The mother used analgesics medicine instead of antibiotic medicine

b) Help Okello to know the proper type of medicine he can use overcome the challenge of **Pneumonia**. **(*1 score*)**

Okello is supposed to use an antibiotic medicine that kills bacteria in the body

c) Advise Okello on the side effects associated with the long-term use of the product mentioned in (b) above and their appropriate mitigations. **(*5 scores*)**

Some people are allergic to some antibiotics that may lead to skin irritation on prolonged use.

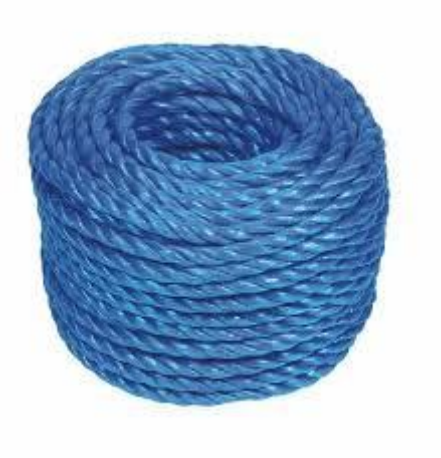
***Evaluation**:*

***Similarity**: Both are modern medicines.*

***Difference:** analgesics are pain killers while antibiotics kill bacteria in the body.*

Item 2.

Kibalama after failing to pass his primary leaving examinations, he wanted to join a technical institution so that he could pursue vocational studies. His mother told him that she never had money that could enable Kibalama to join a technical institution. Kibalama was advised to start up a small business that does not require much capital and he has got an idea of making ropes but he is wondering the proper type of material to use.



Kibalama has been told that you may be of help and he has decided to contact you.

Task

Use your chemistry knowledge to;

a) Explain
   (i) Categories of materials that are used in making ropes**(*3 scores*)**
   Synthetic material because it is man- made and an example is nylon
   (ii) The suitability of the materials used for making ropes**(*3 scores*)**
   - *Nylon is strong.*
   - *It is flexible.*
   - *Nylon is durable.*
   - *It is chemical resistant.*

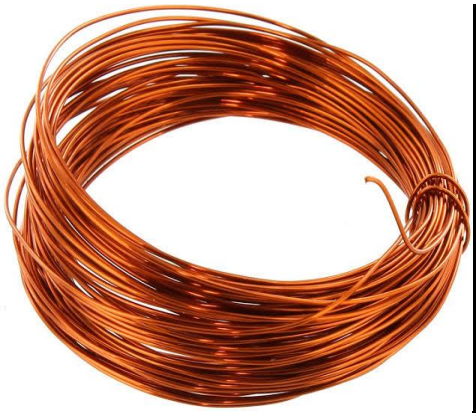
   (iii) Advice Kibalama on the choice of materials.**(*3 scores*)**
   Nylon is used for making;
   - *Clothes.*
   - *Ropes.*
   - *Curtains.*
   - *Carpets.*
   - *Parachutes.*

- *Car seat belts.*
  However, nylon is <u>non-biodegradable</u> when disposed to the environment hence <u>spoils the soil</u> and this can be mitigated through <u>recycling and reusing of nylon</u>.

SECTION B (20scores)
Part 1
Answer **one** *item from this part.*

Item 3

In Uganda there is a need to extend the supply of electricity to different parts of the country. However, there is insufficient supply of copper wires in the country. The government has contracted an investor to set up a new copper extraction plant in Kasese, a copper ore rich district so that he obtains copper that can be used in making copper wires.



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.(**11 *scores)***

<u>Responses to item 3</u>

<u>Raw materials</u>:

copper pyrites (ore)

silicon dioxide.

Process of production:

The ore is crushed and mixed with water containing a frothing agent such as pine oil. Air is blown through the mixture. The ore particles float on the surface as the impurities sink to the bottom.

The froth is skimmed off and dilute sulphuric acid added to break down the froth. It is then filtered and dried.

The concentrated ore is then roasted in air in a blast furnace to produce copper(I) sulphide, iron(II) oxide and sulphur dioxide.

$2CuFeS_2(s) + 4O_2(g) \longrightarrow Cu_2S(s/l) + 2FeO(s) + 3SO_2(g)$

Silicon dioxide is then added to the mixture and heated in absence of air. Iron(II) oxide reacts with silicon dioxide to form molten slag of iron(II) silicate.

$FeO(s) + SiO_2(s) \longrightarrow FeSiO_3(l)$

Copper(I) sulphide is then heated in controlled supply of air to form impure copper.

$Cu_2S(s) + O_2(g) \longrightarrow 2Cu(s) + SO_2(g)$

The impure copper is purified by electrolysis of acidified copper(II) sulphate solution as the electrolyte where impure copper is made the anode and pure copper the cathode.

During electrolysis, the copper anode dissolves and the copper(II) ions are discharged at the cathode to form pure copper.

Anode: $Cu(s) \longrightarrow Cu^{2+}(aq) + 2e$

Cathode: $Cu^{2+}(aq) + 2e \longrightarrow Cu(s)$

Side effect and mitigation:

Toxic fumes produced from the production process can lead to suffocation and then death. This can be mitigated by proper use of personal protective equipment.

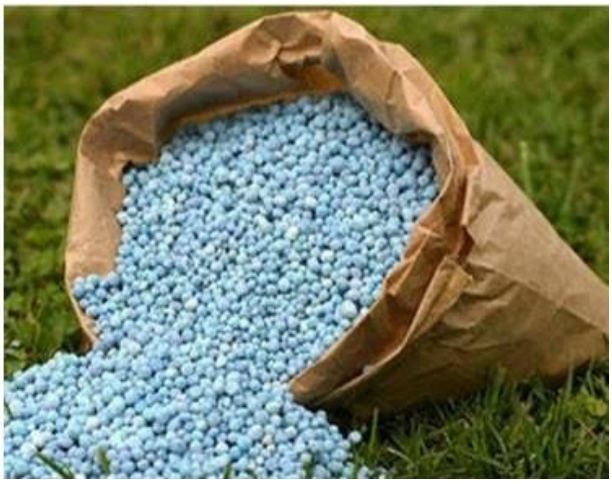
Social benefit

- Employment opportunities; improved/increased income among residents thus better standards of living.

-development of infrastructure e.g. electricity lines, roads, hospitals, schools etc, improved road network will facilitate trade hence improved income and better standards of living.

Item 4

Bukuya Sub County is facing a problem of increased dropout of school by children due to the failure of their parents to have money that is required to pay school fees and the necessary school requirements. This is attributed to the poor yields these farmers are getting these seasons after harvest. The chairperson LCIII of the sub county has been told by the community development officer that these farmers need to start applying fertilizers due to the fact that their soils may now be infertile.

The chairperson LCIII of the area has been advised to contact you for help and has organized a sensitization meeting for all the citizens in the sub county.

Task

Prepare a presentation you will make during the meeting. . (**11 *scores*)**

Responses to item 4

Raw materials:

Nitrogen gas

Hydrogen gas

Process of production:

- *Nitrogen gas from fractional distillation of liquefied air is reacted with hydrogen gas from natural gas in a reactor at high pressure (200atm) and low temperature (400-550℃) in the ration of 1:3 respectively in the presence of finely divided iron catalyst to form ammonia gas. This is called the Haber process.*
  $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$

***Urea**: obtained by reacting liquid ammonia with carbon dioxide*

$2NH_3(aq) + CO_2(g) \longrightarrow NH_2CONH_2(aq) + H_2O(l)$

Side effects:

- ✓ *Runoff into water bodies promoting increased algae growth thus oxygen supply is cut off leading to suffocation and death of aquatic animals.*
- ✓ *Some fertilizers when dissolved in water form acidic solutions that alter pH of the soil hence low crop production.*

Mitigation:

- ✓ *Proper disposal of the fertilizers.*
- ✓ *Limited use of these fertilizers or substitute with organic fertilizers.*

Social benefits:

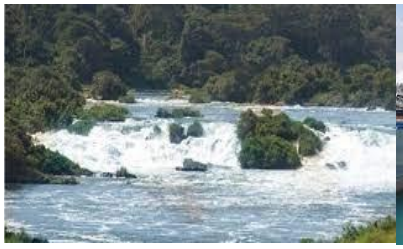
- ✓ *Source of employment as residents get salaries hence improved standards of living.*
- ✓ *High levels of nutrients supplied leading to improved crop production hence better standards of living to farmers.*
- ✓ *Training programs for our community members in various aspects of the manufacture of fertilizers will enhance local skills and expertise.*

Part II

Answer **one** *item from this part.*

Item 5

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, in 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 occasion. On theme "FRESH WATER IS BASIC NECESITY".

Task

Write the presentation you can use**.** **(9 *scores*)**

Responses to item 5

Category of the natural resources

They are classified as;

Renewable natural resources; can be replenished and examples are Air, water, natural vegetation.

Non-renewable natural resources; cannot be replenished and examples are rocks, fossil fuels

Composition of the natural resource

***Water**: is a compound made up of oxygen and hydrogen. It has dissolved minerals, micro-organisms and living things.*

Impact of the natural resource on the environment and mitigation

-Hot water as an effluent from industries when introduced into the water bodies, increase the temperature of the water bodies affecting the life of aquatic organisms.

***Mitigated** by use of hot water reservoirs and effluent deposit points in factories to cool the exhaust water before introduction into water bodies*

-Water contains dissolved oxygen which facilitates rusting of iron containing materials since water and oxygen are necessary for iron materials to rust according to the equation;

$$2Fe(s) + xH_2O(l) + \frac{3}{2}O_2(g) \longrightarrow Fe_2O_3.xH_2O(s)$$

***Mitigated** by use of alloys, painting, galvanizing to reduce on the effect of rusting*

Social benefits of the natural resource:

- ✓ *Water is a habitat for many aquatic organisms; water bodies like lakes, rivers, swamps, dams, pools contain necessary conditions for survival of animals like fish, snails, snakes, worms, bacteria and plants like blue green algae planktons which are fish foods.*
- ✓ *Water bodies like lakes, rivers as well as water vapour from plants play a crucial role in rain formation.*
- ✓ *Water bodies like rivers can be used to generate electricity; fast moving waters to the rivers drive turbines at waterfalls which produce kinetic energy into electrical energy.*
- ✓ *Water from the water bodies evaporates and eventually cools and condenses on the clouds, these results into precipitation.*

Item 6

Uganda as a country is gifted with many rocks and minerals and there is too much extraction of these minerals in the country so that they can be exported to bring in foreign exchange. However the process of extraction of these minerals results into environmental degradation. The government feels like something must be done in order to stop the degradation of the environment through sensitization using various media houses.

Your school has been chosen to the environmental conservation project in your district on the theme "**EXPLOITATION OF ROCKS AND MINERALS IS A NECESSARY EVEIL.**" As a chemistry student you been chosen to present on one of the radio talk shows.

Task:

Write down all the information you will present. **(9 *scores*)**

END

Responses to item 6

Category of the natural resources

They are classified as;

Renewable natural resources; can be replenished and examples are Air, water, natural vegetation.

Non-renewable natural resources; cannot be replenished and examples are rocks, fossil fuels

Composition of the natural resource

Rocks; contain minerals like lime stone, iron, gold, copper, quartz.

Impact of the natural resource on the environment and mitigation

Stone quarrying*: involves breaking rocks into small stones and gravel for construction purposes. This disrupts the underground water cycle and sources hence reduced water quality, air pollution from dust, destruction of vegetation cover.*

Mitigation

- ✓ *Strict government policies and laws against stone quarrying.*
- ✓ *Filling up holes made during the process of quarrying.*
- ✓ *Encourage the population to use alternative construction materials like tiles and clay bricks.*

Social benefits of the natural resource

- ✓ *Rocks filter water and thus provision of clean water from water bodies to the communities.*
- ✓ *Rocks are sources of minerals such as those that are required by the plants.*