

PROPOSED ASSESSMENT GRID
PREPARED BY
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CHEMISTRY

Paper 1

2024

2 hours

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CHEMISTRY DEPARTMENT EXAMINATIONS BOARD

Uganda Certificate of Education

CHEMISTRY

Paper 1

2 hours

INSTRUCTIONS TO CANDIDATES:

This paper has six examination items which are divided into two sections; A and B.

Section A has two compulsory items. Answers to section A must be written in the spaces provided.

*Section B has two parts; I and II. Answer one item from each part.
Answers to section B must be written in the answer booklet(s) provided.*

Answer four items in all.

Any additional item answered will not be scored.

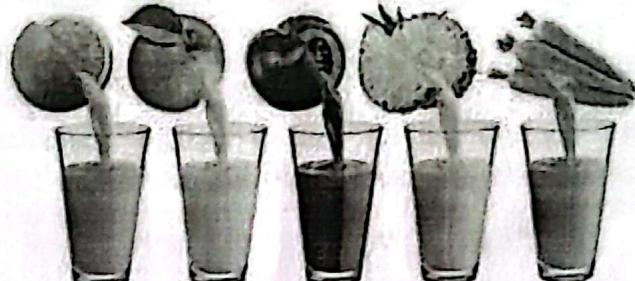
For Examiner's Use Only					
1	2	3	4	5	6
09	09	11	11	11	11

SECTION A

Answer all items from this section in the spaces provided.

Item 1

Musa is increasingly losing customers who are always complaining that his hand made fruit juices get spoilt easily and as well as constantly losing their natural colours.



In order to cater for the customers' complaints, Musa wants to add some ingredients to his fruit juices but he lacks knowledge of what exact ingredient products he should use.

Task:

As a chemistry learner;

- (a) (i) Explain the categories of ingredient products he should use.

Ce
(02 scores)

Synthetic food additives which are man-made.
for example food preservative like sodium nitrate.

- (ii) Explain to Musa how the ingredient products work.

W
(02 scores)

Food preservative prevent the growth of microorganisms. It slows down the growth by introducing conditions that interfere with metabolism of microorganisms.

6/2

- (b) Give the dangers associated with the long term use of the ingredient products.

W
(05 scores)

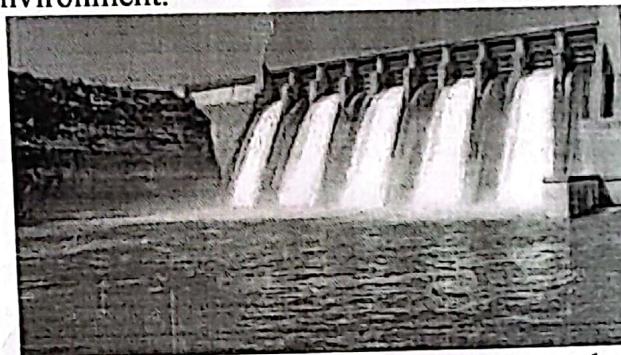
Food preservative can result into increased risk of asthma and cancer such as sodium nitrate. This can be mitigated by opting for alternative preservatives like natural preservatives.
Food preservative can irritate digestive system,

leading to bloating and stomach pain. This can be mitigated by increased fiber intake like fruits which help to move preservatives through the digestive system.

BS

Item 2

The government wants to construct a new strong dam in Isimba region along River Nile in order to increase on hydroelectric power production. It has hired a Chinese dam construction company to execute this exercise using different building materials on market that have minimal impact to the environment.



The chief engineer of the company has promised the government that he will select suitable materials to be used basing on their qualities and properties.

Task:

Use your chemistry knowledge to;

(a) Explain

(i) Categories of materials to be used.

Natural materials which are ~~not~~ made like rocks.

minerals

Synthetic materials which are man-made like

iron

(ii) The suitability of the materials.

(03 scores)

rocks

They are very hard.

They are durable.

They are sustainable.

Iron.

It's very strong

(04 scores)

It has high melting point ✓ ✓
It's ductile and malleable.

Score 04 : 5-6 mentioned.

Score 03 : 1. Any 4 mentioned

(b) Advice the chief engineer about the impacts of the materials to the environment.

Score 01 Any two mentioned

Score 00 Any one

Score 00 None (02 scores)

If iron is disposed into water bodies, it can cause water pollution thus affecting aquatic life. This is mitigated by recycling and proper disposal.

02

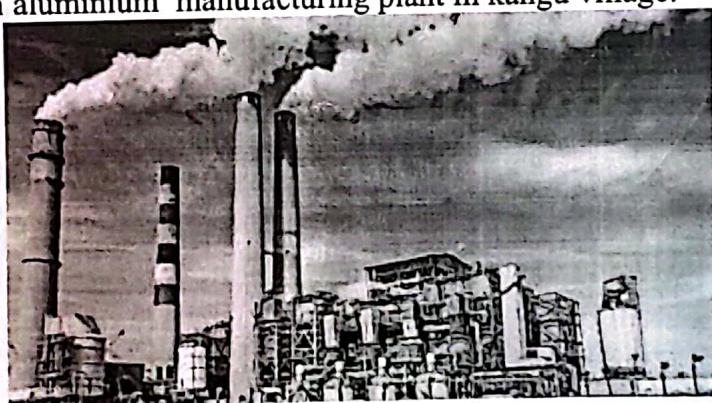
SECTION B

Part I

Answer one item from this part in the answer booklet(s) provided.

Item 3

Rocky ores in Kangu village have been discovered to be rich in aluminium, a substance used to make electricity overhead cables. The government is seeking to increase on number of electricity overhead cables to distribute electricity to various regions and thus has hired an investor to set up an aluminium manufacturing plant in kangu village.



However the locals would like to know how the production process will be carried out and how the plant will impact their area.

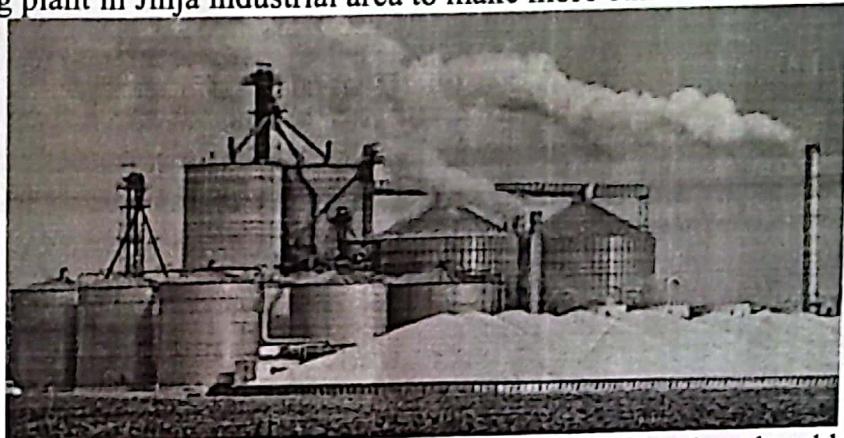
Task:

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

(11 scores)

Item 4

Ethanol is a major component in sanitizers. Following an increased demand for sanitizers countrywide due to covid-19 spike. The government has hired a local investor to set up an ethanol brewing plant in Jinja industrial area to make more ethanol to be used in sanitizers.



The Jinja city council would like to know how ethanol will be produced and how the plant will impact the environment of their city.

Task:

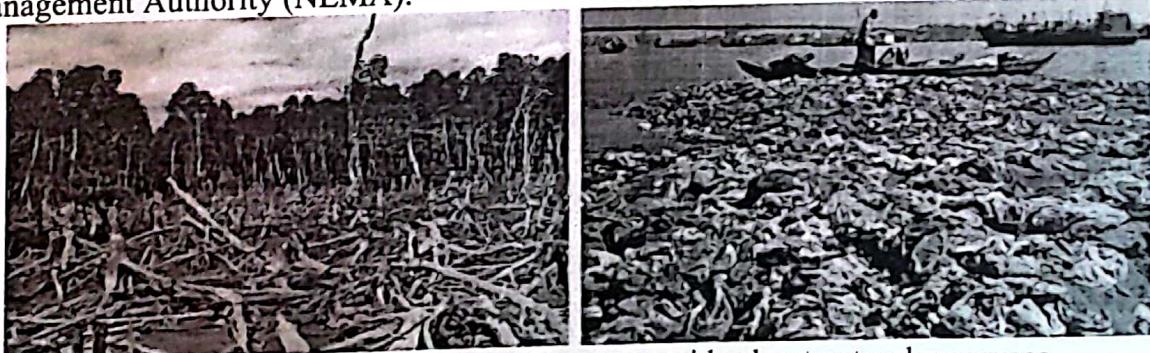
Make a write up you will deliver to Jinja city council answering their concerns. (11 scores)

Part II

Answer one item from this part in the answer booklet(s) provided.

Item 5

There has been a nationwide destruction of natural resources due to increasing population and human activities. This has attracted the attention of officials from National Environment Management Authority (NEMA).



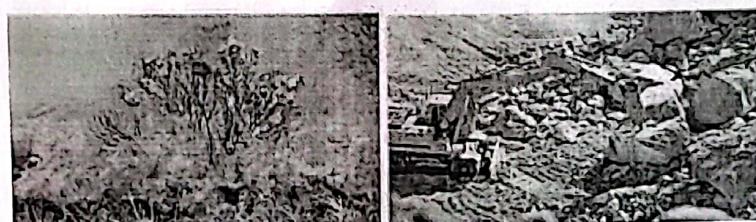
The officials are planning to sensitize people countrywide about natural resources conservation through organizing workshops in different districts.

Task:

As a chemistry learner, write a message you would deliver upon invitation in workshop organized in your district. (11 scores)

Item 6

People in Seroma village have often been found to be carrying out bush burning, over grazing and stone quarrying. They are now facing breathing problems and low soil fertility and are now wondering why this is happening.



The LC1 chairman has organized an emergency village meeting with a theme,
"ENVIRONMENT CONSERVATION, A RESPONSIBILITY FOR ALL."

Task:

As a chemistry student and one of the village members, make a write up about the theme that
(11 scores)

SECTION B.

Part 1

Item 3

Extraction of Aluminium.

Raw materials
Ore (Bauxite). ✓

Process & production.

The ore is first roasted in air to remove any water molecules in it.

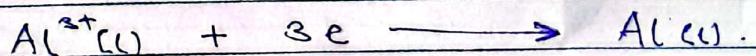
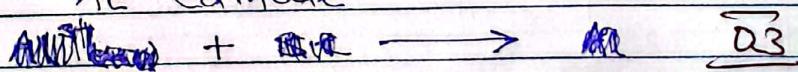
The ore is then crushed into fine powder and concentrated with hot concentrated sodium hydroxide solution in a container to form pure aluminium hydroxide by Bayer's process.

The aluminium hydroxide is heated to form pure aluminium oxide.

The aluminium oxide is dissolved in molten cryolite to lower its melting point to about 800°C .

The molten aluminium oxide is electrolysed between graphite electrodes.

At Cathode



Score 03 : 4-5 mentioned (V, Cd, Cr, Pr, Cu).

Score 02 : Any 3 mentioned

Score 01 : Any one mentioned

Score 00 : None.

Side effect and mitigation.

Toxic fumes by waste gases which when inhaled can cause respiratory disorders to the workers and this can be mitigated by fitting catalytic converters in exhaust pipes of the machines to convert toxic substances into non-toxic compounds.

Q3

Social benefits

Source of government revenue through taxation which results into improved social services like roads. Developed roads facilitate the transportation of goods and services thus better standards of living among the residents.

Q4

II

Item 4

Manufacture of Ethanol.

Raw materials. ^{PM}

Starch ^{any}

Yeast and malt.

^{PM}

^{O2}

Process of production.

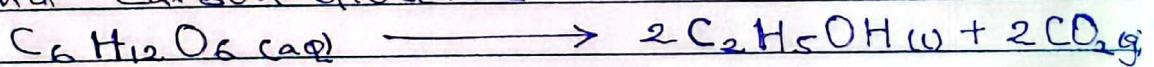
The starch containing material is crushed or some are started to extract starch.

Malt is then added to starch in a container and it is then covered. Malt ^{CP} contains an enzyme diastase that catalyses hydrolysis of starch to maltose.

Yeast is then added to maltose after about 5 days at room temperature.

The maltase in yeast catalyses the hydrolysis of maltose to glucose.

Zymase enzyme in yeast ^{CD} catalyses the breakdown of glucose to crude ethanol and carbon dioxide.



Crude ethanol is converted to pure ethanol by fractional distillation.

Score 03: 4-5 mentioned (V, CP, Ch, Pr, Cd) ~~PM~~

D3

Score 02: Any 3 mentioned

Score 01: Any one mentioned

Score 00: None Identified

Side effects and mitigation.

Hot surface burns from distillation tanks that cause wounds hence pain to workers and this can be mitigated by proper use of required personal protective equipment.

63

Social benefits:

Development of infrastructure like hospitals - Improved hospitals provide better health services to the residents hence improved standards of living.

63

opt other correct alternative responses

11

Part II

Item 5.

Natural resources are categorized into renewable and non-renewable resources.

Score 03: ~~any~~ renewable resources can be replenished (5-6) for example Air, Water.

+ Non-renewable resources cannot be replenished (get used up) for example Rocks, fossil fuels.

Score 01: any 2

Score 00: None. Composition of natural resource
Water is made up of hydrogen and oxygen

Impact of the natural resource on environment, how it occurs and mitigation.

Water pollution caused by farming and agriculture. The use of fertilizers results in eutrophication of nearby water bodies and algae blooms. This can be mitigated by use of organic fertilizers like manure from both animal and plant waste which are biodegradable.

~~anyone~~

Benefit of the natural resource.

Water as a habitat

Water bodies like Lakes, Rivers contain necessary conditions like neutral pH, dissolved oxygen and temperature (0° - 30°C) for survival of aquatic animals like fish.

Accept any other correct alternative.

Item 6

Theme: "ENVIRONMENT CONSERVATION, A RESPONSIBILITY FOR ALL".

Resources in our environment which we use to satisfy our needs include water, air, trees. They are classified as renewable and non-renewable.

Renewable resources can be sustained for example air, water.

Non-renewable resources can be exhausted and not replaceable like rocks, fossil fuels.

Composition of natural resources

Air is composed of nitrogen, oxygen, carbon dioxide, rare gases, water vapour among others.

Rocks contain minerals like limestone, iron, gold, copper.

Impact of natural resources on the environment, how it occurs and mitigation.

Stone Quarrying

This involves breaking of rocks into small stones and gravel for construction purposes. This disrupts the underground water cycle and sources hence reduced water quality. This can be mitigated by imposing strict government policies and laws against stone quarrying.

03

Benefit of the natural resource

Soil formation

03
Rocks break down into smaller particles by weathering process. This is due to exposure to wind, water, temperature change which eventually forms soil and releases nutrients.

II