SAYIDINA ABUBAKAR SECONDARY SCHOOL-KABASANDA
'O' LEVEL CHEMISTRY SEMINAR ITEMS 2025

ELEMENT OF CONSTRUCT 2

THEME: Appreciates applications of chemistry in daily life.

Item 1

Okello a renowned 80 years old herbalist is known for his treatment from the mixing of a variety of plants parts such as lemon peels, garlic bulbs, gingers and raw honey by getting their extracts that he uses for treating his patients with digestive related bacterial infections. Lately some of his patients he treated didn't fully recover from the diseases instead their health conditions worsened and they were admitted to the hospital for further medications. The patients complained that the product has many side effects, wants to know how the product function and make a better choice of medication next time.

Task

As a learner of chemistry,
(a) identify the product that the old man used during the treatment.
(b) help the patient understand the function of the product the old man used.
(c) suggest the possible side effects of the product to the users
(d) help the patient make a right choice of the product to use.

Item 2

Nakayiza a businesswoman operates a restaurant in one of the trading centres. Her restaurant receives many customers compared to other restaurants around the trading center. This is mostly due to the locally available ingredients products like onions, carrots, etc that she normally use when cooking her food giving good taste and aroma to the food which she serves to her customers during meal times. In turn it has created conflicts and misunderstanding between her and other restaurant owners around. Upon reaching the chairperson of the restaurant owners and operators association around the trading centre. The chairperson has called for a meeting to resolve the matter before it goes out of hand informing the members about how the function of the ingredients and and how it can be used with minimum side effect to human life.

Task

As a learner of chemistry,
(a) identify the category of the product which the businesswoman was using.
(b) explain the function of the product she uses.
(c) explain to the restaurants owners the dangers of the product she uses.
(d) evaluate the choice of the ingredients used.

Item 3

In order to enhance performance, athletes have to be physically well. An athlete in senior two is experiencing chronic pain and inflammation in the muscular skeletal system due to poor training. He has tried different locally available products but was not effectively treated. He wants to seek better medication using a product got from a nearby pharmacy in order to treat it effectively, safely and quickly and thus approached you for guidance.

Task:

As a learner of chemistry,

(a) Identify the best alternative product he can use and state its category.
(b) Explain to him the function of the product.
(c) Advise him on the side effects associated with the product.
(d) Make an evaluation of the two products.

Item 4

When Okello felt sick, his mother prepared an aloe vera extract for him which provided a brief improvement on the first day. He then went to a nearby facility where he was diagnosed with

gastrointestinal poisoning known as salmonella infection resulting from taking contaminated food. He was given a product which he used and recovered.

Task:

As a chemistry student,

(a) State the type of the product used which enabled him to completely recover.
(b) Help him understand the function of the product.
(c) Advice him about any danger associated with the product he used.
(d) Evaluate the products he used for treatement from the time he felt sick to the time of recovery

Item 5

Aputi Uranium mine uses the radioactive substance to obtain energy they use to
generate electricity that powers the region. However, the citizens are concerned about radioactive waste management in a temporary facility which could pose environmental contamination.
The plant management has collected data on the count rate per minute of the radioactive waste over a period of 24 hours in order to determine the half-life of the waste and ensure safe storage and disposal. The data collected is presented in the table below

Time (hours)	0	4	8	12	16	20	24
Count rate	800	355	157	69	31	14	6

Task:

As a chemistry learner;

(a) Identify the reaction employed at Aputi Uranium mine to generate electricity.
(b) explain any other use of the form of energy used in the mine to generate electricity.
(c) plot a graph of count rate against time and use it to determine the half-life of the radioactive substance.
(d) explain any other danger associated with the form energy used in the mine to generate electricity.
(e) compare the process use to produce energy in this plant.

Item 6

Aidah and Angel bought white table-towels on the same day. Both Aidah and Angel use spring-water to clean their table towels. Aidah uses only white-star laundry bar soap but Angel uses magic laundry powder also, while washing their table towels. Aidah table- towels have developed many dirty-white spots unlike Angel, after a very short period of time. Aidah also complains that it is difficult to form lather while washing. Aidah is worried.

Task:

As a chemistry learner,

(a) help the gentlemen understand:
  (i) why Aidah is facing that challenge while Angel is not.
  (ii) how the products work.
(b) challenge associated with the use of the products.
(c) guide Aidah on the choice of the product.

Item 6

A boda-boda cyclist got an accident and sustained wounds on the legs. He was immediately treated using tetracycline and the wounds dried after few days. He wondered the magic in the medicine given.

Task:

As a student of chemistry, advice the boda-boda cyclist on:

(i) Category of the product used.
(ii) The function of the product
(iii) Side effects of the excessive use of the product.
(iv) Choice of the product used

Item 7

At the end of year party, a variety of beverages were served. Ocen choose one type which after he drank it, initially made him feel excited and relaxed. However, his movements later become

unconditioned and lacked self-control. His friends who were taking other type of beverage that didn't have the same effect on them,. Repeatedly warned him to stop consuming any more of that beverage.

Task:

As a learner of chemistry,

(a) State the category of the product Ocen took.
(b) Suggest any other use of the active ingredient contained in the product Ocen took.
(c) Explain how excess consumption of such products Ocen used can have serious consequences.
(d) Compare the products served at the party.

Item 8

After several hours of jogging during early morning, Alaro and Acen were feeling very thirsty. They decided to go to nearby supermarket to buy some of the commonly used products in our daily life. Alaro bought bottle soda while Acen bought fruit juice. After drinking the products, they felt relieved from thirst. However, they are both worried about health dangers associated with the long-term use of the products.

Task:

As a chemistry student;

(a) Point out the categories of the products bought by Alaro and Acen.
(b) Explain to both of them how the products work after drinking them.
(c) Advise both of them about the dangers associated with the products.
(d) Compare and contrast the products bought by Alaro and Acen.

ELEMENT OF CONSTRUCT 3

THEME: Appreciates the existance of substance and their interractions within the environment.

Item 9

During a scientific investigation, members of S3 heated 2.52g of calcium in excess oxygen to form 3.52g of an oxide. However, the learners found challenges establishing the formula of the substance formed since they lack some information about it even after being given the atomic masses of calcium as 40, oxygen 16 and molecular mass of the oxide as 56g.

As a learner of chemistry, advice the student of S3 on:

(i) Category of the substance formed
(ii) Properties of the substance its related uses.
(iii) Determine the formula of the oxide formed.
(iv) Challenges associated with the use of the product to the environment.

Item 10

A pharmaceutical company while investigating the effect of amount of magnesium in dietary tablets available in stock added a certain mass of magnesium to hydrochloric acid which led to formation of 4.8 litres of hydrogen gas at s.t.p according to the equation;

$Mg(s) + 2HCl(aq) \longrightarrow MgCl_2(aq) + H_2(g)$

Task

As a learner of chemistry,

(a) Categorize the solids reactants.
(b) Advice the company on the suitability of the solid reactants in relation to its uses.
(c) Determine the mass of magnesium that was used to produce the hydrogen.
(1 mole of a gas occupies 22.4 liters at s.t.p, Mg=24)
(d) Help the pharmaceutical company understand the impact of the aqueous reactant on the environment.

Item 11

Kitchen ware and a number of utensils have certain desirable qualities and properties that render them suitable for use.
An assortment of saucepans revealed that they were made of either stainless steel or duralumin. Your friend in a lower class was asked to explain to the class relevancy of the choice of the materials for the intended purpose and has come for assistance.

Task:

Help the friend.

(a) categorize with reason the material used.
(b) explain the suitability of the materials in relation to their use.
(c) suggest the danger on the environment of using the material and how it can be mitigated.

Item 12

A group of S2 learners came across data showing melting points of elements whose identities they could not understand. They have brought it to you for analysis and interpretation so that they can understand it fully.

Element	Na	Mg	Al	Si	P	S	Cl
Atomic number	11	12	13	14	15	16	17
Melting point (^oC)	98	650	660	1410	44	119	-101

As S4 learner with the knowledge of periodic trends,

Task:

(a) Help the s2 learners understand the categories of the last three of the elements above.
(b) Help them understand how atomic number varies with melting points and why.
(c) Advise them on possible uses of any of the elements above.
(d) Suggest to them the impact of any of the elements above to the environment.

Item 13

Adams, a commercial sugar cane out-grower for Kinyara sugar factory is complaining of low productivity levels from his cane plantations in recent years. He complains that his cane takes long to mature up, the plants themselves are stunted and that the average weight per cane is unusually low. This has affected his earning as he has many workers and services to pay for. He has sought guidance from his friend, an agricultural officer in the district of Amolatar who has informed him that the soil has run out of an essential mineral elements called nitrogen and has referred him to fertilizing products such as calcium nitrate ; $Ca(NO3)_2$, ammonium nitrate; NH_4NO_3,ammonium sulphate; $(NH4)_2SO_4$, ammonium phosphate; $(NH4)_3PO4$ for increased productivity in the next cutting.

Task:

As a learner of chemistry

(a) Explain the category of the fertilizing products suggested.
(b) Explain the suitability of any one of the fertilizing product that make it useful.
(c) Help adams to choose the best of the three recommended products, that best addresses his challenge.
(d) Advise adams on the choice of the fertilizing products.

Item 14

Electrolysis helps us understand nature of compounds and how its used to produce useful chemicals. A group of learners were carrying out electrolysis on a blue compound in a solution for some time, using graphite electrodes to know its nature. They observed a reddish-brown solid on the cathode and a gas that relit a glowing splint at the anode. The dried deposit at the cathode weighed 3.175g.
One learner, amazed about the observations, wanted to know nature of the gas and the amount of the solid deposit in moles and has come to you for help.

Task:

As an expert of chemistry, help the learner to;

(a) Understand the nature of the gas at the anode
(b) Predict the properties of the gas at the anode that makes it useful in life
(c) Determine the number of moles of reddish-brown solid at the cathode if its mass number is 64.
(d) Appreciate the environmental impact of the blue solution to the environment.

Item 15

The choice of materials used in daily life depends on their properties and interactions with other substances in the

environment. The table below shows part of the periodic table showing substances of which some are important in construction purposes, sulphuric acid manufacture among others.

I							VII
	II	III	IV	V	VI	VII	
P		Q			T		

Students were presented with the above table to choose the most appropriate substance that can be used to manufacture construction materials and explore the dangers the material might have on the environment. Your friends has contacted you as a knowledgeable person to give the students guidelines.

Task:

(a) Explain the category to which the substance P and Q belongs.
(b) Suggest the properties that make the substance suitable for the function.
(c) State any other daily life applications of the substance.
(d) Suggest the danger of the materials from the substance from the substance and the mitigation.

ITEM 16

During research, a learner found out that when crude oil is cracked, a substance with short chains are formed which are greatly used in daily life. He also found out that 20kg of the liquid reactant had been cracked.

$$C_{10}H_{22(l)} \longrightarrow C_7H_{16(l)} + C_3H_{6(g)}$$

The learner did not understand the information and has approached you for guidance.

Task:

Help the student to;

(a) Appropriately identify with reason, the category of the compound formed.
(b) Understand the properties of the gaseous product
(c) Determine the amount of the gaseous product formed
(d) Explain the impact of the product compound

Item 17

A senior four student of Sayidina Abubakar secondary school were investigating about two physical properties of certain elements in the periodic table.

They first divided the obtained mass of each element to the volume it was occupying so as to obtain the subsequent density values.

Since the elements being investigated are soft, they decided to obtain Mohs hardness values by researching on the available data on the internet.

The overall data obtained by the students was as shown in the table below.

Element	***Density (gcm^{-3})***	***Mohs hardness***
Li	0.53	0.6
Na	0.97	0.5
K	0.86	0.4

However, the students would like to understand why the elements have varying density and Mohs hardness values plus their environmental impacts. They have approached you for help

Task:

Use your chemistry knowledge to;

(a) Explain the class of the elements being investigated by the students.
(b) Explain to the students, the trends of the two physical properties they were investigating.
(c) Advice the students on the environmental impacts of the elements.

Item 18

In an effort to promote energy and environmental sustainability, the government has recommended a specific hydrocarbon product for public use. The label on the product indicates 74.98% carbon by mass and one mole of the product weighs 16.01 grams. However, the government must first educate the public about the product and develop strategies for its environmentally responsible use. You have been invited to one of the educationist workshops.

Task:

As a chemistry student,

(a) Explain the category of the structure possessed by the product
(b) Determine the molecular formula of the product
(c) Suggest the properties of the product that make it useful in everyday life
(d) Advice on the environmental impact associated with the use of the product

Item 19

An investor intends to set up a chemical company, whose production processes will utilize heating. To optimize these processes, he must first understand the melting trend of a few elements and how to use these elements responsibly. Given the table below.

Period 3 elements	Na	Mg	Al
Melting points(°C)	88.2	1091	2470

For preliminary experiment, small scale experiment they plan to produce 400g of magnesium chloride, a common dietary supplement got by reacting chlorine gas over heated magnesium as equation below. He is interested to know the volume of gas at stp required for the reaction. You have been invited for guidance

$$Mg(s) + Cl_2(g) \longrightarrow MgCl_2(s)$$

Task:

As a learner of chemistry,

(a) explain the category of the elements in the table.
(b) guide him to understand the trend in the melting points of the given elements.
(c) calculate the volume of gas required for the reaction.
(d) advice him the environmental impact associated with use of higher melting point of element.

Item 20

In our lives, the contrast between two materials, diamond and graphite serves as a perfect example of how structure dictates function despite both being made of some element. An investor intends to set up a production facility that will exploit the structural composition of any of the substances but need comprehensive knowledge about them and their environmental impact you have been consulted for guidance.

Task:

As a chemistry student,

(a) explain the type of the structure possessed by the two materials.
(b) suggest the suitability of any material in everyday life.
(c) explain the environmental impact associated with the use of any material.

Item 21

Alpha knitting industries Ltd make school wears (clothes) from cotton. However, clients are complaining that these are easily decomposed by moths and carpet beetles. The managing director has heard of nylon as an alternative. She is not certain of its category, properties, applications and its side effects 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.

Task:

As a chemistry student, guide the manager on;

(a) Category of the selected alternative material.
(b) Explain to her the properties of the material that makes it suitable for its use.
(c) Will the selected alternative have an effect on natural community environment? Advise her.

Item 22

In an attempt to find an alternative fuel for cooking, some industrial workers came up with a new substance Q which on further analysis, was found to be containing 79.9% carbon, while the remaining percentage being hydrogen, it also had a vapour density of 15. The

workers are confused about how to determine the molecular formula of substance Q. The environmentalists have cautioned the industrial workers not to continuously burn substance Q citing that its combustion could potentially lead to deterioration of environment quality. **Task:**

As a chemistry learner,

(a) Explain the category of substance Q.
(b) Give the properties of substance Q that make it useful in our everyday life.
(c) Help the industrial workers to determine the molecular formula of substance Q
(d) (c) Why should the industrial workers adhere to the advice of the environmentalists?

ELEMENT OF CONSTRUCT 1

THEME: Appreciates the contribution of chemistry to our economy.

Item 23

The government has cleared a foreign crude oil development company to construct a crude oil refinery in Hoima district so as to increase on production of crude oil fractions used to run automobiles. However, the residents are eager to know how the crude oil refining process will be conducted and how the refinery will impact their area. The company CEO has selected a team of specialists in which you are among, to meet the residents and clarify about what they would like to know.

Task:

Use your chemistry knowledge to make a write-up that you will present to residents upon meeting them.

Item 24

There is high demand of sodium hydroxide in soap manufacturing industries as a raw material in Uganda. An investor was contacted by government to setup sodium hydroxide manufacturing plant at Ading, one of the village in Amolatar to tap into the opportunity. However, the residents seem not to understand how the process will occur plus its consequences and are resisting the project. As a student with the knowledge of chemistry, you are required to create awareness to the members and provide the necessary information.

Task:

Write a presentation you will use upon meeting them.

Item 25

In your senior three class you went to Mukwano for a study tour, the process of production of soap was fully explained to you. Due to the outbreak of Ebola, the demand for soap increased. The government have decided to increase soap production in Uganda by setting up two factories in the western part of this country but is looking for an expert. The residents seem to fear land grabbing and are not pleased.

You have been invited to a radio talk show to advise the government on the production process and also assure the residents the importance of establishing these industries in their area.

Task:

As a chemistry learner, prepare a write up of the information you would deliver at the talk show.

Item 26

The Ugandan government has rolled out a project of constructing an ammonia manufacturing plant in Lira district to increase on production of ammonia, a key ingredient in making explosive substances to boost the military sector. However, the district local council members are concerned about how ammonia will be produced plus harms and goods associated with the plant being constructed in their area. The government has chosen you to represent it during a special meeting and you are to enlighten the local council about their concerns.

Task:

Make a brief write-up you will use during your presentation in the special meeting.

Item 27

Chlorine is an important substance that is used as a raw material in the production of various pharmaceuticals. A chemical plant is built

to produce chlorine to be used in pharmaceutical industries. The plant aims to achieve zero carbon emissions and also benefit the society at large. However, many Ugandans lack knowledge on how the production process and its benefits can be achieved with minimal impacts to the environment. Your fellow colleagues are also interested in understanding the same and have approached you for guidance.

Task:

As a learner of chemistry, make a write up that will benefit your classmates and the rest of the Ugandans.

Item 28

A contractor governing a certain construction site is mainly in need of lime for Mortar production, which will be used in restoration of a Historic building. However the lime available is not enough to finish the construction site. Your company, EcoLime, has been contracted to supply high quality lime to the construction site, and has therefore set up a Lime Production plant. However, the community is concerned about its environmental effects and how the process will occur. Some individuals are not certain as to whether the plant has any other benefit except jobs and the revenue to the people and the Government. A team of S.4 students in your school have been appointed to attend the community workshop.

Task:

Prepare a presentation you will make during the workshop, as the leader of the team.

Item 29

Air which is a mixture of different components contains 21% oxygen. Due to a wide spread of respiratory illnesses in the country, there is 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 government officials from the ministry of health would like to know how the production process will occur, the associated environmental impacts of the production process and how these can be mitigated. A member from your school have been selected to address the officials and make a presentation during the grand opening of the plant.

Task:

As chemistry student, make a write up of what to present.

Item 31

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

Task:

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

Item 31

Iron is an essential raw material used in the manufacture of tools, construction equipment, and infrastructure such as bridges and roads. With Uganda's growing population and the ongoing push for industrialization, a private investor has identified iron ore deposits in a rural district in eastern Uganda and plans to establish an iron smelting plant in the area. While some local leaders welcome the project for its potential to stimulate development, many residents have expressed concern about its possible effects on their health, environment, and farmland. As a result, they have approached their LC1 chairman, demanding a clear explanation before the project proceeds. In response, the chairman agrees that the community must first be sensitized about what the industry involves. He has requested that residents be educated on how iron is processed, what benefits the factory could bring, what negative side effects may

occur, and what steps can be taken to manage or prevent these problems.

Task:

As a student of chemistry, prepare a write-up that the LC1 chairman can use to educate his community.

Item 32

Nearly all motor vehicles in Uganda use acid batteries. An investor wants to set up a factory for manufacturing the acid that Ugandans need for their batteries however the investor needs to document on the process of production, the side effects of the production process and how the factory will benefit the surrounding communities. You have been identified as one who is qualified enough to provide the information.

Task:

As a chemistry learner, with the chemistry knowledge, write a guide to the investor.

ELEMENT OF CONSTRUCT 4

THEME: Appreciates the existence of natural resources in the environment and their importance in daily life.

Item 33

Juma is a patriotic youth who has noted that people in his area are practicing stone quarrying, plastic burning and dumping of faeces and urine in the river. Such actions have affected several natural resources in the area triggering several challenges. This has prompted Juma to seek permission from area LC1 chairman to organize an emergency meeting to create an environmental awareness to the residents. However, he lacks proper coherent knowledge of what to tell the residents during the meeting and he has approached you for assistance.

Task:

Use your chemistry knowledge to prepare a write-up which Juma will use during the meeting.

Item 34

People of Kigogoma town have been found to be practicing zero grazing, cutting down trees and papyrus reeds from nearby forest and swamp for construction and making mats respectively as shown in figures 4, 5 and 6. This has resulted into several challenges in the town.The town environment management authority has decided to start an environmental conservation campaign to sensitize residents about sustainable use of the affected natural resource. You are a patriotic citizen who has decided to join the campaign.

Task:

As a learner of chemistry, make a write-up you can use to sensitize fellow residents during the campaign.

Item 35

In one of the districts in Uganda, rocks and minerals are increasingly being extracted from the land through activities like quarrying and open-pit mining. These activities have grown rapidly, often taking place without clear guidelines or proper regulation. This has raised concern among local residents, especially as they begin to observe changes in their surroundings and livelihood. A group of elders and youth leaders from the area have approached their Member of Parliament (MP), voicing concerns human activities have affected the community. They worry that the activities may not be 4 sustainable and may be causing more harm than good. The MP has agreed that it is important for the community to understand the value of these resources, how they are being used, and the possible impact of misusing them. In response, the MP has organized a public dialogue to raise awareness among the residents. You have been invited to contribute to this dialogue based on your knowledge of chemistry and natural resources.

Task:

As a learner of chemistry, prepare a message you will deliver to the residents during the meeting.

Item 36

In a rapidly growing town in Uganda's central region, the increase in vehicles, small factories, and open burning of waste has led to noticeable changes in the quality of the air residents breathe. Many

people, especially children and elderly, have started experiencing respiratory problems. Concerned by these health issues, the community members approached their local council chairperson to raise their worries. The chairperson acknowledges the problem but believes that many residents may not fully understand what causes poor air quality or how it affects their health and environment. To address this, the chairperson has organized a community meeting and invited you, a chemistry student, to educate the people on the importance of clean air and ways the community can protect and improve the air they depend on.

Task:

As a learner of chemistry, prepare a message to deliver at the meeting.

Item 37

Upon the discovery of the coal reserves in some parts of Kigezi region, the locals raised environmental impact associated with its exploitation. They also lacked comprehensive knowledge of importance of coal. This has prompted the government to conduct a regional workshop to raise awareness amongst the public to be informed about crude oil. You have been invited to attend address the public.

Task:

As a chemistry student, prepare a short message you will use to deliver in the workshop.

PRACTICAL ITEMS

Item 38.

A newly established factory is manufacturing babies pampers from a salt that absorb the urine produced by the child. The good quality salt for use without burning a child is the one that produces heat below 21kJ during its manufacture. The factory owners have purchased metal Y to use in making the salt. However, they do not know whether this metal is suitable or not. Metal Y reacts with hydrochloric acid to evolve heat according to the following equation.

$$X(s) + 2HCl(aq) \longrightarrow XCl_2(aq) + H_2(g) + Heat$$

You are provided with:

BA1 which is a solution of hydrochloric acid used by the factory.

Metal X which is a sample taken from the factory purchased batch.

Task

As a learner of chemistry,

(a) design an experiment you would carry out to determine the suitability of Metal X.
(Your design should include aim, hypothesis, variables, apparatus and materials, procedure, risks and their mitigation.)

(b) carry out the experiment and record your results. (A minimum of six readings required)

(c) analyse your results and inform accordingly.

Item 39

At a newly established grinding mill in Ading Trading centre, water plays a crucial role in various processes including cooling, lubrication and parts cleaning. Recently there have been concern about the impact of water hardness on the efficiency and life span of the machinery. Mr. Obote- the grinding mill owner has assigned to you a tasked to help him choose which of the water sample collected from different borehole A, B is more suitable for use based on their hardness. A suitable water for use at the grinding mill forms a lather easily with soap solution.

You are provided with:

FA1 which is water sample collected from borehole A.

FA2 which is a water sample collected from borehole B.

BA1 which is a soap solution.

Any other apparatus found in the chemistry laboratory.

Task:

As a learner of chemistry

(a) design and carry out an experiment that can help Mr. Obote make a right choice of the
borehole water to use.

(Your design should include aim, hypothesis, variables, apparatus and materials, procedure, risks

and their mitigation.)
(b) carry out the experiment and record your results.
(c) analyse your results and inform Mr. Obote accordingly.

Item 40

At Amai community hospital, medical workers regularly clean metallic instruments with acid solution before sterilization. A close inspection by a surgical team observed that some of the instruments were wearing out at a high rate due to strength of the acid used i.e. the stronger the acid the higher the rate of wearing. One of the ways of determining the strength of acids is by measuring the quantity of heat produced when an acid reacts with sodium hydroxide solution.
You have been tasked by the in charge to make a choice to use at this hospital supplied by respective two companies A and B.
You are provided with:
BA1 sample of acid supplied by company A.
BA2 sample of acid supplied by company B.
W a solution of sodium hydroxide.
Any other laboratory apparatus found in a chemistry laboratory.

Task:

(a) design and carry out an experiment you can use to make the right choice.
(Your design should include aim, hypothesis, variables, apparatus and materials, procedure, risks and their mitigation.)
(b) carry out the experiment and record your results.
(As minimum of six readings required)
(c) analyse your results and inform the hospital in charge accordingly.

Item 41

A factory produces acidic waste water as a by-product. If not treated, this waste water can pollute water in a nearby water bodies causing death of aquatic animals.
A nearby water treatment plant treats the waste water in order to make it not harmful. They have been recently supplied with new consignment- solution W to remove the effect of the acid by neutralization reaction with waste water without affecting aquatic life but its suitability has not been tested.
$30cm^3$ of solution W is added 3 drops of phenolphthalein indicator and to the resultant solution, waste water is added drop by drop to solution W untill the pink-coloured solution turn colourless which marks the end point of neutralization reaction.
For solution W to be suitable, not more than $25.0cm^3$ of waste water should be used.
An intern chemist was assigned to perform last weeks test and advice on the suitability of the new supply.
You are provided with the following

- Solution W
- BA1 which is a sample of waste water from the factory
- Any other apparatus found in the chemistry laboratory

Task
As a learner of chemistry,

(a) Design an experiment you expect the intern to have carried out.
(Your design should include aim, hypothesis, variables, apparatus and materials, procedure, risks and their mitigation.)
(b) Carry out the experiment and record your results
(c) Analyse your results appropriately
(d) Draw a conclusion and advice on the suitability of the new supply