Candidate's Name……

Signature……

CHEMISTRY DEPARTMENT

Element of construct 3 Sample questions .

Element of construct 3: ***The learner appreciates diversity and interactions of substances and their importance in life.***

Assessable Areas.

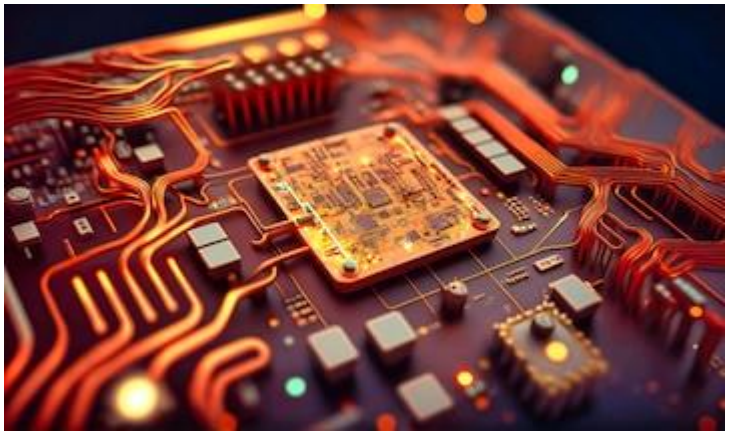
(I) Elements, compounds and mixtures.
(II) The periodic table.
(III) Trends in the periodic table.
(IV) Reactivity series.
(V) Structure and bonds.
(VI) Mole concept.
(VII) Materials other than plastics.
(VIII) Polymers and plastics.

Basis of assessment.

(a) Category of element, compound, substance or material with a reason.
(b) Properties or prediction or properties of element, compound, substance or Material.
(c) Uses of element, compound, substance or Material/applications/quantity of matter i.e moles
(d) Impact/pollution of environment by element, compound, substance or material and mitigations.

Item 1.

John's smartphone got a problem with it's circuit board. The specialist noted that copper pathways that connect to other components needed to be changed, and to be narrower than usual to fit the dense component lay out. John was not convinced why pathways were made of copper and has come to you for advice



Task.

Use your chemistry knowledge to ,

(a) Explain the category of substance the pathways are made up of.
(b) Explain the suitability of material used for pathways on circuit board
(c) Guide John that copper cannot only be used for pathways on circuit boards.
(d) Guide John on the environmental impact of copper.

Item 2.

A manufacturing plant produces Aluminium , brass and Mable chips. The company is expanding it's operations, and want to ensure that it's process are environmentally sustainable. New worker have been employed into the manufacturing plant but lack adequate knowledge about the products and he has come to you for guidance.

Task.

Use your Chemistry knowledge,

(a) Explain
  (I) Categories of materials.
  (II) The suitability of the products.
(b) Guide the new employee about the applications of the products.
(c) What are likely challenges associated with the use of the products.

Item 3.

A student on research intends to design a new structural material for a special purpose, considering both *Aluminium* and *magnesium* with minimal environmental impact. He consulted you for advice regarding their properties, which would enable him during production.

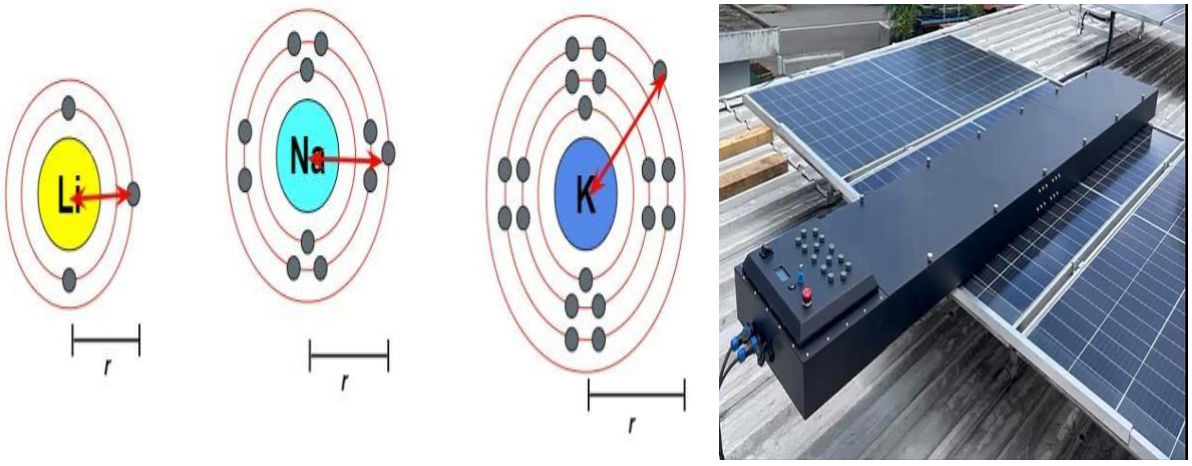
Task.

Use your knowledge to,

(a) Explain the
  (I) categories of the elements.
  (II) suitability of the elements.
(b) Guide the student on the different applications of the elements.
(c) Guide the student about the environmental impact of the elements.

Item 4

Ibrahim is a student who is making research about how he can develop a new type of Solar panel that requires an element with enough size which can promote the effectiveness and efficiency of the solar panel system. He opts to use any of the three metals , Lithium, sodium and potassium but not confused about which metal will do it better. He consulted you for some guidance.



Task.

As a Chemistry student,

(a) Explain the categories of the above elements.
(b) Guide Ibrahim to make the best choice for the suitable metal to be used over others.

(C) Briefly write how the element selected promotes the effectiveness and efficiency of the solar panel system?

(c) Advise Ibrahim on the challenges associated with the use of the metal of his choice.

Item 5.

A material processing plant , located near a water source, manufactures products made of aluminum, sodium and copper. The products are highly demanded because of their quality, so a lot of products are availed on market by the manufacturing plant. . National Environmental Management Authority (NEMA) assessed the quality of water in nearby water source, following the breakdown of the plant's waste water treatment system, and later closed the factory.

Task.

As a Chemistry student,

(a) Explain which element was specifically responsible of the company's closure by NEMA.
(b) Explain the suitability of the elements.
(c) Guide the locals in your community about the applications of elements
(d) Advice the public about the environmental impacts of the elements

Item 6.

A manufacturing company has developed a new type of cell that uses two substances, *graphite* and *sodium chloride*. Muhammad, a student visited the factory and was briefed about the new development, but could not understand the role of the two substances basing on their nature of structures and properties. He has approached you for more guidance.

Task,

Use your Chemistry knowledge,

(a) Explain the categories of the two materials.
(b) Explain the Suitability of the two materials.
(c) Guide Muhammad on ,
    (I) the other applications of the two substances.
    (II) the likely challenges associated with the long term of the two substances.

ITEM 7.

Your family friend, has just completed construction of his residence without environmental. He used different building materials of different quality and properties on market.

Task.

Use of chemistry knowledge to;

(a) Explain;
  (I) the categories of Materials used in construction.
  (II) the suitability of the materials used in construction.
  (III) the choice of the materials used in construction.

(d) Explain the challenges associated with the materials used in construction.

ITEM 8.

Plastics are the most useful substances made up of elements extracted from fossil fuel resources. Akram, a student on research has come to you to guide him about plastics which are without doubt, a benefit to mankind despite it's environmental effects.

Task.

As a Chemistry learner,

Use your knowledge to;

(a) help Akram understand the categories of plastics..
(b) explain to Akram what makes categories of different plastics of added value to human use..
(c) guide Akram understand that plastics have been without doubt a benefit to mankind.
(d) help Akram understand the challenges associated with the use of plastics in life

ITEM 9.

A manufacturing company is made up of two sections, each dealing in production of different kind of products made from two different materials, *polychloroethene* and *Cellulose* . The sales manager's report noted about that


demand of the different products on market made from the two substances.

Task.

As a Chemistry student,

(a) Explain the categories of the materials used in the production of the different products.
(b) Explain the suitability of the two materials.
(c) What products are supplied from the different sections?
(d) Help the public understand the environmental impacts of the products.

ITEM 10.

An investor set up an industry dealing in production of various products of different quality and properties, made from different materials which are thread -like structures, thin and flexible. The locals were concerned about the nature of the products and their impact on the environment. The Executive officer contact to talk to the locals

Task.

Use your Chemistry knowledge to,

(a) Explain the,
  (I) Categories of the materials used in production process.
  (II) The suitability of the materials used in the production process.

(b) Guide the locals about the different applications of the materials used in production basing on their choice of materials.

(c) Advise the locals on the challenges associated with use of the products of their choice.

ITEM 11.

While reading a book with tittle " *material science* " , Jane came across a statement in one paragraph "…… *The contrasting unique structures of two substances, iron and diamond highlight their applications in human life , illuminate the path to technological innovations and inviting further exploration and discussion of their impact on world.* …….. " Jane failed to understand the statement and has come to you for clarification.

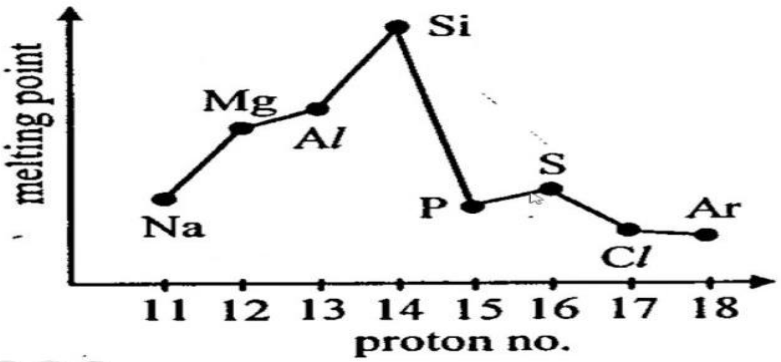

Task:

Use your Chemistry knowledge the structure of substances to;

(a) Guide Jane to understand the categories of two materials
(b) Guide Jane to Understand the suitability of the two materials.
(c) Inform Jane about the applications of the two materials.
(d) Inform Jane about the environmental impact of the two materials.

ITEM 12.

John and Peter, made research about the diversity of properties of elements and how these properties change horizontally across the periodic table. They didn't understand the trend observed on the graph. They have come to you for assistance



Task.

As a Chemistry learner,

(a) help the two boys to understand the identity of the elements.
(b) guide the two boys to understand the trend of the property shown on graph above.
(c) what applications suit the property of sodium from graph above.
(d) Guide the two boys about the environmental impact by any one element from the graph.

ITEM 13.

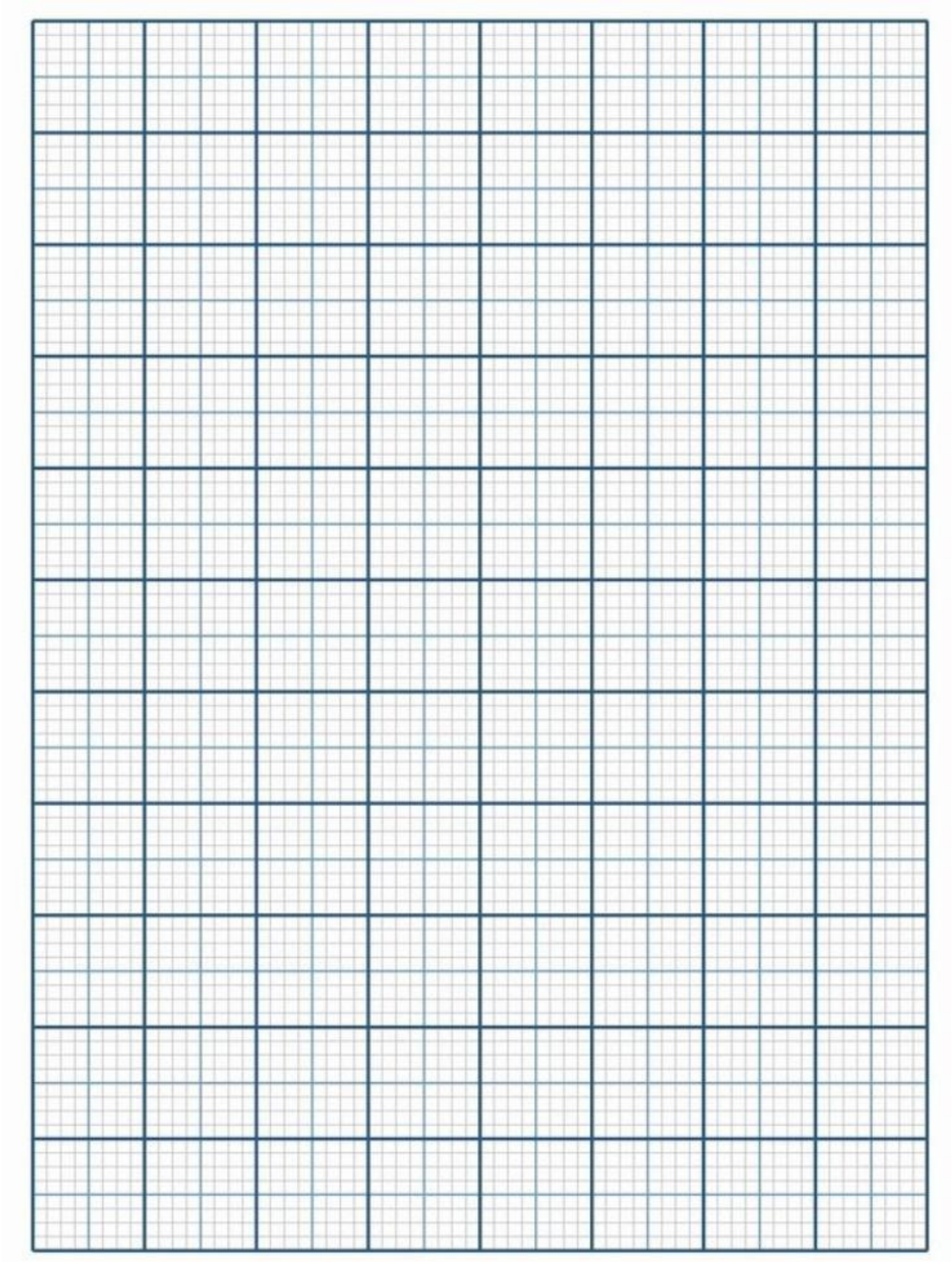
Hajarah, made research about the diversity of properties of elements and how these properties, change horizontally across the periodic table. . below is a table of results she came across while on her research. She has come to you for guidance.

Task:

Element	Proton number	Symbol	Melting point (K)	Boiling point (K)
Sodium	11	Na	371	1156
Magnesium	12	Mg	922	1380
Aluminium	13	Al	933	2740
Silicon	14	Si	1683	2628
Phosphorus	15	P	317	553
Sulphur	16	S	392	718
Chlorine	17	Cl	172	238
Argon	18	Ar	84	87

As a Chemistry learner;

(a) Guide Hajarah on;
  (I) the category of the elements.
  (II) The trend of the properties of the elements in the table using graphical approach.
(b) Application of one any one element in the table.
(c) Environmental impact of any one element in the table.



ITEM 14.

Sisal is prized for it's exceptional qualities and unique properties making it an ideal material for various applications . An investor has just set up a factory dealing in sisal production. He has encouraged the locals to engage in sisal as main activity yet they lack knowledge about sisal.

Task.

Use your Chemistry knowledge;

(a) to help the locals to understand the category of sisal.
(b) to guide the locals about the suitability of sisal.
(c) to guide the locals about the different applications of sisal.
(d) sensitive the locals about the environmental effects of sisal.

ITEM 15

Upon the discovery of graphite mineral in the metamorphic rocky areas of North Eastern Uganda ,an investor opened up a graphite blocks factory in one town. The investor was inspired by the unique type of structure of graphite that lies in the

arrangement and bonding of it's particles, which the factory uses to develop innovative solutions that exploit the structural composition of graphite.

Task.

Use your Chemistry to;

(a) explain the identity of graphite.
(b) explain the suitability of graphite for different innovative development.
(c) guide the locals about the innovative solutions the factory has developed from graphite's unique structural composition.
(d) Guide the locals about the ecological footprint of reliance on this remarkable resource

ITEM 15.

In an attempt to explore the relationship between elements, John and Mary made research about the periodic table. They noted that relationship between elements shown by their atomic numbers and electronic configuration govern the way how chemical and physical properties of elements. They used the information below and failed to understand some concepts about their properties. They have come to you for guidance.

Lithium	**Atomic Number 3**	**Mass Number 7**
Sodium	**Atomic Number 11**	**Mass Number 23**
Potassium	**Atomic Number 19**	**Mass Number 39**

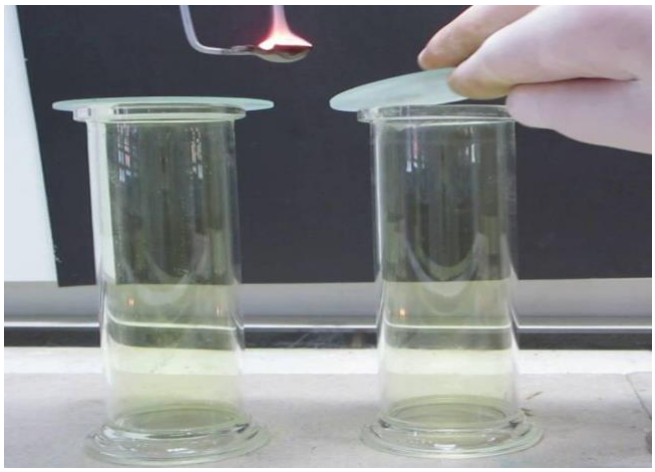
Task.

Use your Chemistry knowledge to;

(a) Explain the identity of the elements.
(b) Help the two to understand;
  (I) the chemical reactions of the elements with water.
  (II) the prediction of the melting points of the element from Lithium, sodium to potassium.
(c) provide a methodology approach of obtaining the number of moles of Sodium that completely reacted with 2.8dm3 of chlorine gas at S.t.p ,

when John lowered a piece of burning sodium into gas jar of given volume of gas . Reaction occurs as equation below.

$$2Na(s). + Cl2(g) \text{ ----------} 2NaCl(s)$$



(d) Guide the two students about the challenges associated with use of the elements above .

ITEM 16.

The physical properties of elements have made them indispensable in wide range of of industries, many becoming workhorses in a variety of applications. In an attempt to know more about these properties, Jesca downloaded the table of elements below but couldn't understand well some trends of properties of elements and reasons for their adoption in every day life. She has come to you for guidance.

	Melting Point	Boiling Point	Density (at 20 °C)
Lithium	180.54 °C	1347 °C	0.534 g/cm^3
Sodium	97.81 °C	883.0 °C	0.971 g/cm^3
Potassium	63.65 °C	773.9 °C	0.862 g/cm^3

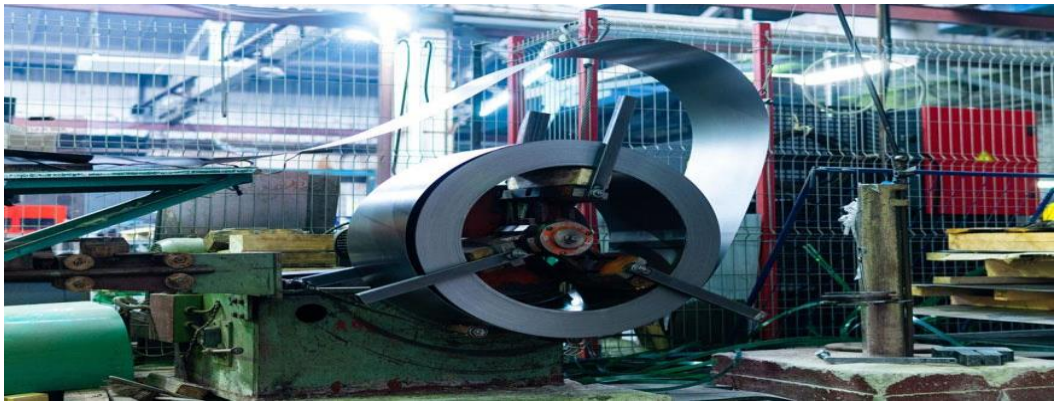
Task,

As a Chemistry learner, guide Jesca,

(a) about the categories of the elements.
(b) about,
  (I) the trend in the first two properties of elements from Lithium to sodium.
  (II) other physicals properties of the elements.
  (III) Trend of reactivity of elements from Lithium to sodium
  (IV) the reaction of the elements with chlorine.
(c) about the uses of the elements as a result of unique properties.
(d) On the environmental impact of the elements.

ITEM 17.

The Uganda Investments Authority cleared an local investor to set up a stainless steel factory. Stainless steel, the back born of modern infrastructure and industry boast an impressive array of it's properties that have made essential materials in our lives. The investor has organized a one day workshop to inform the locals about the stainless steel. Your are contacted to help talk to locals.



Task.

Use your Chemistry knowledge to,

(a) Explain the,
  (I) Identity of stainless steel.
  (II) The suitability of stainless .
(b) Guide the locals about the applications of stainless steel.
(c) Environmental effects associated with the use stainless steel.

ITEM 18.

John, while on his research work, wanted to know how atoms of elements combine to form compounds. He chose to study about sodium chloride and carbon tetrachloride. Sodium chloride known as table salt and carbon tetrachloride have vastly different properties which have led to diverse applications . John has come to you for guidance to clearly understand the concept.

Task .

Use your Chemistry knowledge to guide John,

(a) about the Categories of the two substances.
(b) On the qualities of the two substances that align with their functionality.
(c) about the practical applications of the two substances.
(d) Understand that as we rely on these substances, they have environmental implications.

Task 19.

The reactivity series is a fundamental concept that has practical applications in our daily life and wide range industrial applications. Jimmy went to XYZ water tank manufacturers , and was tasked to indentify which of metals lead, calcium, copper and magnesium are suitable for designing water tank . He didn't have thorough knowledge about the selection. He came to you for guidance.

Task.

As a Chemistry learner, use your Chemistry knowledge to ;

(a) help Jimmy categorize the metals which he can use suitably and those he can leave out.
(b) advise Jimmy on the physical suitability of those metals he selected for use to design a water storage tank.
(c) guide Jimmy on how the company utilizes the other metals he left out.

(d) understand that while reactivity series has enabled man to harness the properties of elements, we should also be mindful of their environmental implications

ITEM 20.

One company deals in producing dilute Sulphuric acid, which they supply to motor garages for use in car batteries. The company needed more storage metallic tanks, and contacted two men at one metal fabrication factory. They got confused about the the task given to them since they lacked knowledge on selection of metals for designing the tank. They have approached you for guidance.

Task.

Use your Chemistry knowledge to,

(a) guide the two men about metals to choose from for designing the tank.
(b) Guide the two men on the features of selected metals that match their intended use.
(c) Guide the men about other applications of the selected metals.
(d) Guide the two men and understand that the selected metals have significant environmental impacts which can be addressed to promote a more sustainable future.

End.