Chemistry work book(for form 3 and 4)

Text book writer and editor

Abdiasis M.Awil

Main writer Assistants

Eng Fu'ad Abdi yousuf $(chemistry\ teacher)$

Sa'ad Mohamed Abdi $(student)$

Essa Ahmed Hussein$(student)$

First published in ____/_____/_____
By Burao printing centre

Abdiasis mohammed

Mob:-252-63-4531821 or 4724382

Republic of  **Somaliland**

All rights reserved no part of this book
may be reproduced, stored in a retrieval system
or transmitted in my form or by any means
mechanical, photocopying, recording or otherwise
without permission of the owner.

AKNOWLEDGEMENTS

Thanks to almighty *ALLAH* who made possible to end for this book.
The completion and publication of this book haven't been an easy task.
It took time, energy and a lot of exertion to compile this valuable book.
I am extremely grateful to our my parents and my dear **teache**r **ENG Fu'ad Abdi yusuf** , and Sa'ad Mohammed Abdi, Essa Ahmed Hussein, Abdirshid Mohammed Awil, Mohammed Hashi Ali for their assistant and consultance in the preparation of this book.
Last but not least I wish to thank the ministry of education and higher studies of Somaliland for setting the syllabus outline which this book is entirely based on.

Table of Contents

Chapter one:- Acid, Bases, and Salts **1**

Multiple choices 2

Structural questions 3

Chapter two:- Metals and reactivity series **4**

Multiple choices 5

Structural questions 5

Chapter three:-Non metals 5

Multiple choices 5

Structural questions 5

Chapter four:- Electrolysis 5

Multiple choices and matching 5

Structural questions 5

Chapter five:- Rate of reactions 5

Multiple choices 5

Structural questions 5

Chapter six:- Organic chemistry(3&4) 5

Multiple choices 5

Structural questions 5

Chapter seven:- Atomic structure 5

Multiple choices 5

Structural questions 5

Chapter eight:- Mole and stochiometry 5

Multiple choices 5

Structural questions 5

Chapter nine:- Chemical bonding and structure 5

Multiple choices 5

Structural questions 5

Chapter ten:- Energy in chemistry(Enthalpy change) 5

Multiple choices 5

Structural questions 5

Added questions 5-5

Chapter one:- Acid, Bases, and Salts

Multiple choice

1) What products are formed when an acid and a base react?
A. Water and Hydrogen
B. Hydrogen and Oxygen
C. Salt and Water
D. Base and Water

2) A certain solution recorded a pH of 4. This can be described as
A. Neutral
B. Basic
C. Acid
D. Amphoteric

3) When a blue litmus paper is dipped in an acidic solution

A. Turns red
B. Turns pink
C. Turns colorless
D. Remains blue

4) A solution with a PH of **8.5** would be described as
A. Very basic
B. Very acidic
C. Slightly basic
D. Slightly acidic

5) A liquid is determined to be an acid or base depending on the type of _____in a liquid
A. electron
B. proton
C. ion
D. element
E. neutron

6) PH scale is defined as
A. A method for measuring the proton in a solution
B. A measurement of how acidic or basic in a liquid
C. A special microscope used to look at acid
D. All of the above

7) How do acid tasted compared to base
A. Acids are sweet and bases bitter
B. Acids are bitter and bases are sweat
C. Acids are sour and bases are bitter
D. All of the above

8) True or false:- Acids with a low pH and bases with a high pH are considered very dangerous
A. True B. False

9) Sulphates which are insoluble salts are the following except
A. Magnesium sulphate
B. Calcium sulphate
C. Lead sulphate
D. Barium sulphate
10) Insoluble salts were prepared by a process called _____during this process it added two_____salts
A. Titration, soluble
B. Titration, insoluble
C. Precipitation, soluble
D. Precipitation, insoluble
11) All of the following are common acids except
A. Hydrochloric acid
B. Carbonic acid
C. Nitric acid
D. Ammonium chloride
12) The hydrogen concentration of a hydrochloric acid solution whose pH number is 3 is
A. 0.001
B. 0.0001
C. 0.002
D. 0.003
13) Acids react with metal carbonates forming
A. Salt, water and carbon monoxide
B. Salt, water and carbon dioxide
C. Only salt and water
D. None of the above
14) Which of the following solutions will turn phenolphthalein to pink color solution?
A. HCl(aq)
B. CH_3OH(aq)
C. H_2O
D. NaOH(aq)
15) If the difference between pH and a pOH of a solution is 6 then pH is
A. 14
B. 12
C. 10
D. 8
16) When acids and bases are added to each other they react to neutralize each other if_____
A. Reaction gets a heat
B. Reaction gets a catalyst
C. There is equal number of hydrogen ions and hydroxide ions
D. There is unequal number of hydrogen ions and hydroxide ions.
17) The characteristic properties of an alkali are due to presence of
A. Hydroxide ions
B. Hydride ions
C. Hydrogen ions
D. None of the above

18) The pOH values of alkali solutions are A, B, C, D, E, are 13.1, 12.4, 10.0, 9.6. and 14.0 respectively. Their order of alkalinity is

A. D< C< B< A< E
B. A< C< D< A< E
C. E> $A > B > C > D$
D. None

19) The concentration of acid s due to

A. Number of protons it contains
B. Number of neutrons it contains
C. Number of electrons it contains
D. Total number of protons and neutrons

20) All of the following are organic acids except

A. Tanic acid
B. Hydrochloric acid
C. Carbonic acid
D. Citric acid.

Structural questions

1) This question is about the reactions of acids and alkalis.

a) Give the **name** of:

(i) a strong acid ……

(ii) a strong alkali ……..

b)

(i) Write an equation for the reaction between an acid and an alkali.

……

(ii) What name is given to this type of reaction?

……

c) If only part of the replaceable hydrogen ions of an acid is replaced by a metal, an acid salt is formed. Give the **name or formula** of an acid salt.

……

d) Some of the reactions of acids and alkalis with other substances follow a general pattern. Write balanced equations to show examples of these patterns of reactions.

(i) carbonate + acid ⟶ salt + water + carbon dioxide

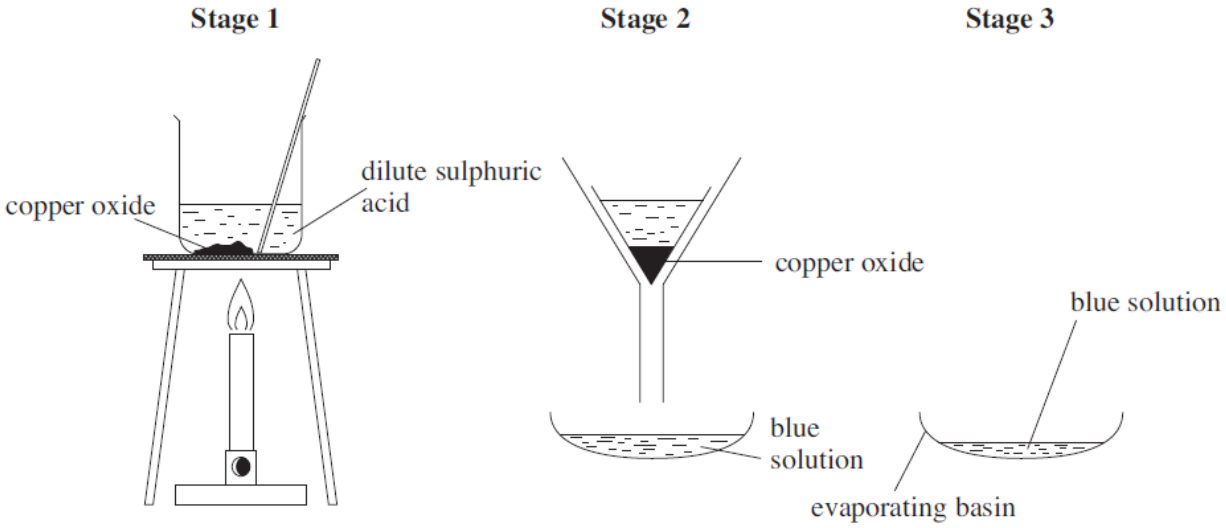
……..

(ii) ammonium salt + alkali ⟶ salt + water + ammonia

…….....

2)

The diagrams below show stages in making the compound copper sulphate by reacting copper oxide with dilute sulphuric acid.



Copper oxide is added to warm dilute sulphuric acid until ***all*** the acid is used up. The mixture is continuously stirred.

a.describe what you would expect to see when all the acid has been used up?

……

……

b.

(i)Name the process used in ***stage2***?

……

……

(ii) Name the substance removed during ***stage3***?

……

……

c.

(i) Give the name of the base used in this experiment?

……

……

(ii)Give the name of the salt formed in this experiment?

……

……

3) Lithium nitride reacts violently with water to form a solution of lithium hydroxide and ammonia gas.

Complete the following equation by inserting the appropriate state symbols.

$Li_3N(s) + 3H_2O(\ldots\ldots) \rightarrow 3LiOH(\ldots\ldots) + NH_3(\ldots\ldots)$

(ii) Suggest a value for the pH of the solution formed.

Give a reason for your answer.

Ph……..

reason……

3) Alongside the names of various chemicals below are shown their respective pH values in aqueous solution.

potassium hydroxide	pH 13
hydrogen bromide	pH 2
calcium hydroxide	pH 11
sodium chloride	pH 7
hydrogen chloride	pH 2
magnesium hydroxide	pH 10
citric acid	pH 4

Which of the substances is/are:

a. a strong acid?

……

b. a weak acid?

……

c. a strong alkali?

……

d. a weak alkali?

……

e. a neutral substance?

……

4) Write a chemical equation to represent the neutralization of sulfuric acid by sodium hydroxide.

……

……..

5) Explain, with the aid of examples, what you understand by the following terms:

a. strong acid

……

……
b. weak acid
……..

……..
c. strong alkali
……..

……..
d. weak alkali
……..

……..
e. concentrated acid.
……..

……..
6) Explain the following, with the aid of examples:
a. neutralization
……..

……..
b. titration
……..
……..
c. soluble salt
……..

……..
d. insoluble salt.
……..

……..
7)
a.
i. Hydrochloric acid is formed when hydrogen chloride gas dissolves in water. Suggest the pH of hydrochloric acid. Put a ring around the correct answer.

pH 1 pH 7 pH 9 pH 13

ii. Complete the equation for the reaction of hydrochloric acid with zinc.

zinc + hydrochloric acid → zinc chloride + _____

b. A small piece of potassium was placed in a beaker of water. The equation for the reaction is

$2K(s) + 2H_2O(l) \rightarrow 2KOH(aq) + H_2(g)$

i. What is the most likely pH of the solution in the beaker when the reaction is complete?

Put a ring around the correct answer.

pH 2 *pH 6* *pH 7* *pH 8* *pH 12*

8) a. In Arrhenius definition what characterizes an

i) Acid

…… ……..

……..

ii) Base

……..

……..

b. In a bronsted- lowry model what is an

i) Acid

……..

……..

ii) Base

……..

……..

9) As the hydrogen ion concentration of a solution *increases*, does the pH of the solution increase or decrease? Explain?

……..

……..

……..

10) List three properties of

i) Acid

……..

……..

……..

ii) Base

……..

……..

……..

11)

a) In your own words what is ***meant by salt***?

……

……

b) Explain how to prepare of salts?

……

……

……

……

c) How many types of salts?

……

……

d) Give an example which you could prove your answer(ii)?

……

……

e) In your own words explain the process called precipitation?

……

……

……

f) Give two examples of precipitation?

……

……

12) Write the balance chemical equation for the reaction between sodium hydroxide and

i) Hydrochloric acid

……

……

ii) Nitric acid

……

……

iii) Sulphuric acid

……

……

13)

a. What causes

i) Acidity

……

……

ii) Alkalinity

……

……

b. Give two solutions of Alkali?

……

……

14) A strong acid has a weak conjugate base, where as a weak acid has a relatively strong conjugate base. Explain.

……

……

……

15)

a. Calculate the hydrogen ion concentration. In solutions with each of the following pH values

i. pH= 1

……

……

…… $[H^+]$ =……

ii. pH= 4

……

……

……$H^+]$ =……

iii. pH= 5.99

……

……

……H^+] =……

b. Calculate the hydroxide ion concentrations, for solutions with each of the following pOH values

i. pOH = 7.00

……

……

……$[OH^-]$ =……

ii. pOH=13.00

……

……

……$[OH^-]$ =……

iii. pOH= 5.0

……

……

…… $[OH^-]$ =……

iv. Calculate the hydroxide ion concentration given for the pH of the solution ***5***?

……

……

……

…… $[OH^-]$ =……

c. Calculate hydrogen ion with available for hydroxide ion of 4.3×10^{-4}

……

……

……

…… $[OH^-]$ =……

16)

a. Firstly what do scientists use to measure the acidity of a liquid?

……

……

b. Explain how to use to know or recognize the power of acid and alkali?

……

……

……

c. Litmus is a common indicator which is used to tell weather something is an acid or a base.

i. If you dip a piece of blue litmus paper into an acid what color will it turn?

……

……

ii. If you dip a piece of red litmus paper into an acid what color will it turn?

……

……

d. What color is methyl orange in alkali condition?

……

……

17) Complete the table below in the missing places in your understand

Kind of reaction either soluble or insoluble salt	**Reaction(Acid+Alkali)**
……	HNO_3+KOH→ $KNO_3 + H_2$
Insoluble salt	……
……	$H_2SO_4 + Mg(OH)_2 \rightarrow MgSO_4 + H_2O$
Soluble salt	……

18) When you add an acid to an alkali you can track the neutralization

i) What is meant by the term ***Neutralization***? And neutral substance?

……

……

……

……

ii) How many ways we can track the neutralization?

……..

……

iii) Describe each one of the ways?

……..

……..

……..

iv) Write down two types of daily life uses of neutralization?

……..

……..

19) The following table shows the pH of some common substances.

Substance	**pH**
Lime water	10.5
Saliva	6.4
Lemon juice	2.2
Orange juice	2.6
Milk of magnesia	10.0

a) Use only information from the table to answer parts (i) and (ii)

(i) Name the strongest acid?

……

(ii) Name the substance closest to being neutral?

……

b) Milk of magnesia is used to treat indigestion. It contains magnesium hydroxide which reacts with excess hydrochloric acid in the stomach.

(i) Write down the word equation and chemical to show the products formed.

……..

……..

……..

20) Complete the table below by using either ***Acid*** or ***Alkali***

Property	Acid or Alkali
1.Turns litmus paper into red	……..
2.Turns litmus paper into blue	……..
3.Have a sour taste	……..
4. Have a bitter taste	……..

5. They react with metals forming hydrogen and salt	……..
6. All of them except ammonia will react ammonium compounds during or getting out.	……...

Chapter two:-Metals & Reactivity series

Multiple choice

1) The property of metal bt which it can be drawn into wires is called
A. Conductivity
B. Ductility
C. Malleability
D. Purified
2) Which metal id found in liquid state at room temperature
A. Fe
B. Zn
C. Hg
D. Pb
3) Which of the following is a transition metal?
A. Nickel
B. Calcium
C. Potassium
D. Magnesium
4)The symbol of platinum is
A. Pl
B. P
C. Pt
D. None
5)…….is the only metal that is a liquid at room temperature.
A. Mercury
B. Sodium
C. Argon
D. Potassium
6) Copper sulfate is added zinc
A. Zinc cannot displace copper from its compound
B. Zinc can displace copper from its compound
C. No reaction occur
D. Reaction needs energy
7) Which of these metals react oxygen vigorously?
A. Aluminium
B. Sodium
C. Copper
D. Zinc
8)To get metal from the earth we take only three steps except

A. Searching
B. Mining
C. Extraction
D. Purification

9) _____is how easily a metal lose an electron
A. Reactivity series
B. Electrochemical series
C. Electronegative series
D. None

10) The order of this elements due reactivity series Mg, K, Al, Ca, Na, and C is
A. Ca, Mg, Na. K, Al, C
B. K, Na, Ca, Mg, Al, A and C
C. C, Na, Ca, Mg, Al, A and K
D. None

11) Hydrogen can displace from its compounds by the following except
A. Lead
B. Silver
C. Gold
D. Copper

12) The metal which doesn't react cold water but react hot water or steam is
A. Cu
B. Au
C. Ag
D. None

13) An alloy is
A. Mixture
B. Homogenous mixture
C. Heterogenous mixture
D. Compound

14) Which of the following metals only extract by ***electrolysis*****?**
A. Fe
B. Mg
C. Al
D. Cu

15) What happens when clean iron flings are placed in copper II sulphate solution?
A. Iron is oxidized
B. Iron *(iii)* sulphate is formed
C. copper ii ions is oxidized
D. No reaction

16) Which of the following elements burns in air to produce an acidic oxide.
A. Al
B. S
C. Na
D. Mg

17) The raw materials which extraction of iron needs are the following except
A. Iron ore

B. calcium carbonate
C. coke
D. Graphite
18) What happens when calcium is treated with water?
I. It reacts violently with water
I. no reaction occur
II. Bubbles of hydrogen form
IV. It reacts less violently with water
A. I and II
B. IV and I
C. IV and III
D. II and III
19) Metals are different reactivity according to:-
A. Physical properties
B. Chemical properties
C. Substance they react
D. A & C
20) Potassium reacts cold water producing
A. Flame
B. Bubble
C. Fizzing sound
D. None

Structural questions

1) Molybdenum (Mo) is a metal. It is often used to make an alloy with iron.
Like iron, it is extracted from its oxide. Unlike iron, it occurs mainly as its sulfide.
(a) Molybdenum sulfide is converted into molybdenum oxide by heating in air.
The equation for this reaction is
$2MoS_2 + 7O_2 \rightarrow 2MoO_3 + 4SO_2$
(i)Why is molybdenum said to be oxidised in this reaction?

……

…… ……..
(ii) The sulfur dioxide formed in the reaction could form acid rain if it escaped into the atmosphere. Write a chemical equation for the formation of an acid from sulfur dioxide.
……..

……...

…….. ….

2) Aluminium and iron have some similar properties.

Both metals
☐ are malleable
☐ are ductile (can be drawn into a wire)
☐ are good conductors of electricity
☐ are good conductors of heat
☐ have a high melting point
(a) i) Choose two properties from the list that make iron a suitable metal for saucepans
……..

……

……
(ii) Choose two properties from the list that make aluminium a suitable metal for power cables.
……

…… ……
(b) Steel is an alloy containing iron.
These are three differences between steel and aluminium.
☐ steel can rust but aluminium resists corrosion
☐ steel has a higher density than aluminium
☐ steel is much stronger than aluminium
(i) Use information from the list to suggest why steel is the better metal for making bridges.
……

……

…… ……
(ii) Use information from the list to suggest why aluminium is the better metal for making aircraft bodies.
……..

……

……...
(c) $2Al + Fe_2O_3 \rightarrow Al_2O_3 + 2Fe$
by using a reaction above answer this question.
(i)What does the reaction suggest about the reactivity of aluminium compared to the reactivity of iron? Explain your answer.
……..

……

……

……

3) Why magnesium is malleable and conduct electricity.

……

……

4) Use the following list of metals to answer the questions **a** to **g**:
(iron, calcium, potassium, gold, aluminium, magnesium, sodium, zinc, platinum, titanium.)

a. Which of the metals is found in nature as the ore:

i. Bauxite?

……..

……...

ii. Hematite?

……

……

b. Which of the metals will not react with oxygen to form an oxide?

……

……..

c. Which of the metals will react violently with cold water?

……

……..

d. Choose one of the metals in your answer to **c** and write a balanced chemical equation for the reaction which takes place.

……

……

……

f. Which of the metals has a protective oxide coating on its surface?

……..

……

g. Which of the metals reacts very slowly with cold water but extremely vigorously with steam?

……

……

5) Which is the most abundant metal in earths crust?

……

……

6) State properties of metals including their ductility?

……

……

……

……

7)

a. A group of students wants to extract Alumunium by their ore(bauxite) but they don't know the suitable method to extract it.

i. In your own mind which method is suitable to it by helping those students?

……

……

ii. Why you select this method(i)?

……

……

iii. Describe how these process happen?

……

……

……

iv. Write a chemical equation for this process?

……

……

v) Write

Cathode equation Anode equation

…… ……

…… ……

b. Iron is second abundant metal in the earths crust therefore we can extract from their ore.

i. In which way we can extract iron from their ore?
……

……

ii. The reaction process of iron is

- ✓ The coke reacts with oxygen
  Write a chemical equation?
  ……

  ……
- ✓ Limestone decomposes to form calcium oxide and carbon dioxide.
  Write a chemical equation?
  ……

  ……
- ✓ Carbon dioxide reacts with more coke to form carbon monoxide.
  Write a chemical equation?
  ……

  ……

iii. The reaction below shows carbon monoxide reacts iron oxide forming iron and carbon dioxide

$$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$$

Which one occurs reduction and which one occurs oxidation?
Cu=……

Fe=……

iv. In last the remaining calcium oxide reacts with silica to form slag.
Complete the equation

$$\boldsymbol{CaO + SiO_2 \rightarrow \ldots\ldots\ldots\ldots}$$

8) Define the following terms
A. Reduction
……

……

B. Rusting
……

……

C. Ore

……

……

D. Alloy

……

……

E. Electrolysis

……

……

F. Reactivity series

……

……

G. Reactivity

……

……

Chapter three:- Non metals

Chapter four:- Electrolysis

1.Multiple choice

1) Any substance that doesn't conduct electricity
A. Conductor
B. Insulator
C. Liquid conductor
D. Solid conductor

2) The oxidation number of nitrogen in ammonium ion is
A. +3
B. -3
C. +4
D. -4

3) The electrolysis of dilute hydrochloric acid we find in cathode and anode in
A. Cathode(H) , Anode(Cl)
B. Cathode(H) , Anode(OH)
C. Anode (H) , Cathode(Cl)
D. Anode(H) , Cathode(OH)

4) The oxidation state of Cl in KCl is
A. -1
B. +1
C. -2
D. +2

5) Which one of the following lists shows the ions present in NaCl?
A. Na, Cl , OH, OH ions
B. Na , H , Cl , OH ions
C. Na, C , Cl , OH ions
D. N , Cl , H , OH ions

6) The mass of substance at each electrode during electrolysis is governed by
A. Number of coil
B. Size of current
C. How far current flows
D. Size of the mass

7) Quantity of electricity is measured by
A. The product of mass and farady's constant
B. The division of mass and farady's constant
C. The product of quantity and current flow
D. The product of current flow and time taken

8) Which of the following statements is correct?
A. During purifying metals electrodes are graphite
B. During purifying metals electrodes are plastic
C. During purifying metals electrodes are rubber
D. None of the above

9) $CuO + H_2 \rightarrow Cu + H_2O$

By using the above equation the oxidating and reducing agents are
A. Cu is oxidating agent while H is reducing agent
B. H is oxidating agent while Cu is reducing agent
C. No reaction occur
D. All of the above

10) During electrolysis
A. Oxidation occurs at the cathode : Reduction occurs at anode
B. Reduction occurs at the cathode : Oxidation occurs at anode
C. Oxidation occurs both electrodes
D. Reduction occurs both electrodes

11) Which of the following methods **CANNOT be used to** prevent rusting?
A. Electroplating.
B. Oxidizing in the presence of moisture.
C. Galvanizing.
D. Painting.

12) In electrolysis of alumunium oxide it must be
A. Liquid
B. Solid
C. Molten
D. Plasma

13) Oxidation is defined as?
A. Electron loss
B. Electron gain
C. Electron sharing
D. Proton loss

14) Which of the following is not true? Electrolysis involves:
A. Attraction of cation to cathode
B. The decomposition of an electrolyte by an electric current
C. Conversion of chemical energy into electrical energy
D. Use of electrical energy to perform redox reaction

15) Which of the following substances will not conduct an electric current?
A. Dilute sulphuric acid solution
B. Magnesium metal
C. Sugar crystals
D. Aqueous sodium chloride solution

16) The moles of electrons obtained from 250 C of electricity could be
A. 5 mol
B. 2.5 mol
C. 0.0025 mol
D. 0.25 mol

17) Aluminium is used to construct aircraft because
A. It is very reactive metal

B. It has a shiny attractive surface when cleaned
C. Aqueous sodium chloride solution
D. It is strong and light and protected by an oxide coating

18) Which of the following is not use Electrolysis?
A. Anodyzing
B. Electroplating
C. Extracting of metals
D. Alloying of metals

19) In purifying copper by electrolysis the cathode electrode should be made up of
A. Pt
B. Cu
C. C
D. Ag

20) Elements whose oxidation number is increased are
A. Reduced
B. Hydrogenated
C. Oxidized
D. None of the above

21) During the electrolysis of an aqueous solution of ***KI***, what substance is formed at the cathode?
A. Iodine
B. Hydrogen
C. Oxygen
D. Potassium

22) An electrolytic cell uses electrical energy to drive
A. Chemical reaction
B. Physical reaction
C. No reaction
D. All of the above

23) The oxidation number of S in CUSO_4 is
A. +6
B. -6
C.+2
D. -2

24) In an electrolytic cell a metal ring was to be electroplated with silver.
Current of 0.3A was used to deposit 6.5g of silver on to the ring from a silver nitrate solution and the time required electroplate a ring with silver was close to
A. 1minutes
B. 10 second
C. 50 second
D. 20 second

25) The number 96500 is used in electrolysis calculations, this number is
A. Charge on one mole of electrons
B. Mass on one mole of electrons
C. the number of electrons in one mole
D. None

Matching

put the correct word in blank space

(Rate of reaction , electrolysis , graphite , reduction , electroplating , hydrides , liquid conductor, reduced , oxidized , oxidation number , oxidation,)

1) ……conducts electricity by free electrons.

2) ……conducts electricity by free ions.
3) ……process of coating a metal with another metal.
4) ……is a measure of fast or slow something is.
5) If a substance gains electrons during the reaction it is……
6} If a substance gains oxygen during the reaction it is ……
7) ……,,number of hydrogen is +1 except in metal …… where it is -1.
8) ……is the apparent charge that on element has in compound or ion.
9) …… substance which will carry electric current only when it is molten or dissolved.
10) ……takes place at the anode and involves a negative ion losing electrons.

Structural questions

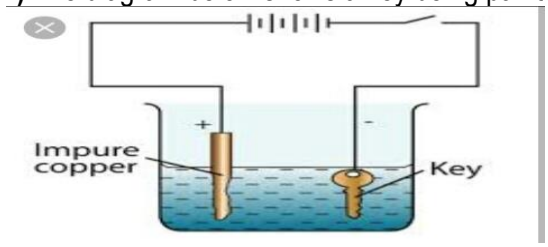
1)The box below contains six substances
{Carbon, copper , molten aluminium oxide , molten wax , silver , sulphur} choose only substances from the box to answer the following questions **each substance can be used once more than once or not at all** name the substance which is:-
i} Metal that allows electricity to pass through it.
……

ii} Non metal that doesn't conduct electricity to pass through it.
……

iii}compound that conducts electricity.
……

iv} metal used in electrical wires.
……
v} non metal found in a dry cell(battery).
……

2) The diagram below shows a key being painted with copper



i) Why is the key is attached to the negative terminal of the DC supply?.

……

……

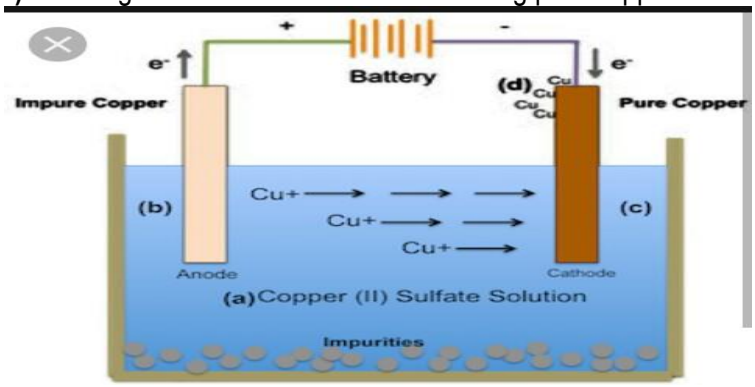
ii) List three objects that are often electroplated and name metal in each case.
……

……

……

iii) Which object is located at
A. Cathode……
B. Anode ……..

3) The diagram shows a method for obtaining pure copper from impure



A.
i. By which process is copper normally extracted from its ore?

……
ii] Give one advantage of using purified copper instead of impure copper?

……
……
iii] In this reaction the slime of the cell floor what is checked for?
……

……

B. Magnesium sulphate solution was electrolyzed using platinum electrodes. Give the products at the cathode and anode?

……

……

……

……

4) Calculate the mass of hydrogen formed when a current of 0.4A is passed through hydrochloric acid solution for 3hours?

……

……

……

……

……

…… Amount in mass……g

5) Find out the number of moles of electrons required 7g of Aluminium on the surface of another metal?(**RAM 27g/mol**)

……

……

……

……

……

…… N.of moles……mol

6) Find the quantity of electricity used up when 5A of electricity passed through an electrolyte for 30 minutes?

……

……

……

…… Quantity…….coulumb

7) Determine the oxidation number of Mg in the compound**(MgO)?**

……

……

……

8)

a. Why covalent substances are non conductors?

……..

……..

……..

b. A student takes in an Ionic substance (solid) he checked for an electricity the substance does not conducts electricity, but they conduct when it melted or dissolved in water

i. Why are non conductors conduct electricity when it was solid?

……

……

……

ii. Why it conducts when it dissolved in water?

……

……

iii. Give three solutions when they are solid are non conductors, when it dissolved in water change into conductors?

……..

……..

……..

C. What are only solids which are conductors?

……

……

i. One of them what character make it conductor?

……

……
ii. All conductors same in conducting but Some of solutions participate the reaction does graphite participate the reaction? Why?
……..

……

……

9) How much gram of copper(II)Sulphate formed for a current of 4A following for 40 minutes using copper electrodes?
……

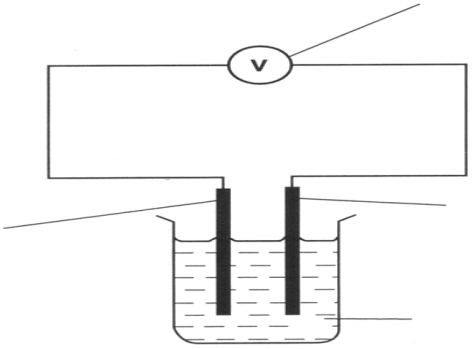
……

……

……

…… Amount in grams…….

10) A simple cell changes chemical energy into electrical energy.
The cell contains two metallic electrodes in an electrolyte as shown in the diagram. **Useful data**
(Electrodes are zinc electrode and copper electrode respectively while solution is dilute Sulphuric Acid)



A) The more reactive metal reacts with the acid and goes into solution as ions.
(i) Which is the more reactive metal in the cell? ……..
(ii) Give an ***ionic half equation*** to show the more reactive metal forming ions.
……

……
B) Charged particles move in the outer circuit to the less reactive metal where a Gas is formed.
(i) Name the particles that move through the outer circuit? …….
(ii) Name the gas formed? ……..

C) A graphite rod could be used instead of the copper electrode.
Give a reason why this is possible?
……

……..
D) State whether the voltage of the cell would increase, decrease, or stay the same if the zinc electrode was replaced by an iron electrode. Give a reason for your answer?.
……..

……
11) What mass of copper could be deposited from copper(II) sulphate solution using a current 6 A over 20 seconds?
Useful data (molar mass of Cu= 64 g/mol , charge(valency)= 2
……...

……...

……

……

…….. Mass of Cu……g

12) Two students tried to coat an iron key with copper using electrolysis. They set up the apparatus as shown in diagrams ***1*** and ***2*** below.

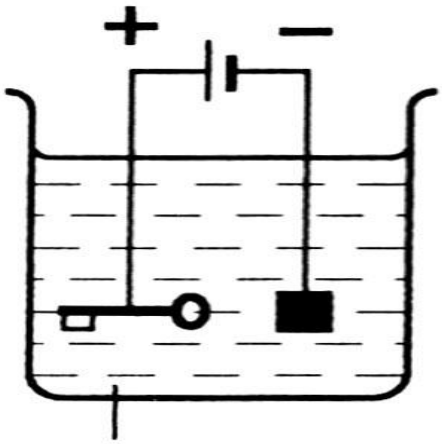


Diagram:1 Solution/Electrolyte

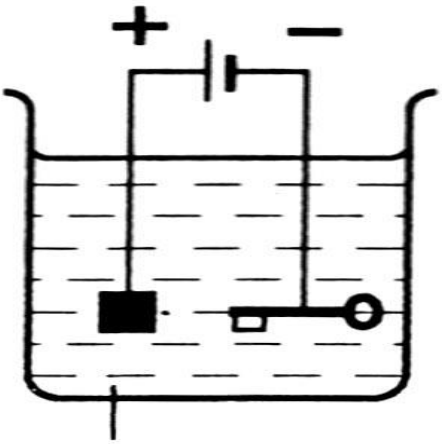


Diagram:2 Solution/ Electrolyte

A.
(i) In which apparatus would the metal key be electroplated with copper.
……

……..

(ii) Give one reason why objects made of iron are electroplated.
……

……

B.
Suggest the name of a solution which would be suitable as an electrolyte in this Experiment?
……..

…… ……

C. put a thick next to the ionic half equation that represents the plating of copper on the iron key.
$Cu - 2e \rightarrow Cu^{2+}$ ☐
$Cu^{2+} + 2e \rightarrow Cu$ ☐

D. Calculate the number of Faradays required to plate 0.127g of copper.
……..

……..

……..

…….. Faradays number……..

13) Lead can be extracted from lead(II) sulfide, PbS, in two stages.
Stage 1: Lead(II) sulfide is heated in air. It reacts with oxygen to produce lead(II) oxide and sulfur dioxide.
Stage 2: The lead(II) oxide is then heated in a blast furnace with coke.
a.Write a chemical equation for the reaction in **Stage1**
……

……

b) The equation for the reaction that occurs when lead(II) oxide is heated with coke in a blast furnace is:

$$2PbO + C \rightarrow 2Pb + CO_2$$

(i)State with a reason, whether PbO is oxidised or reduced in this reaction.
……

……

14) In electrolysis of molten lead(II)bromide.
i. The reaction occurring at the negative was viewed an oxidation reaction why?
……..

……..

ii. Write the ionic equation for the reaction occurring at the positive.

……

…… ……

iii. What is the alternative name for the positive electrode.

……

……

iv. What color is the vapour seen at the positive electrode.

……

…… ……

v. What is mean by ***ELECTROLYTE.***

……

…… ……..

vi. What is the electrolyte for this reaction.

……

……

15) Which ions are present in:-

a. Sodium chloride. Identify the ions going in either *Anode* or *cathode*

……

……

……

…… ……..

b. Ammonia solution.

……

……

c. Nitric acid solution.

……..

……

16) The electrolysis of concentrated aqueous sodium chloride produces three commercially important chemicals: hydrogen, chlorine and sodium hydroxide.

a. The ions present are $Na^{+}_{(aq)}$, $H^{+}_{(aq)}$,$Cl^{-}_{(aq)}$ and $OH^{-}_{(aq)}$

i) Complete the ionic equation for the reaction at the negative electrode (cathode).

_____ + _____ → H_2

ii) Complete the ionic equation for the reaction at the positive electrode (anode).

_____ + _____ → Cl_2

iii) Explain why the solution changes from sodium chloride to sodium hydroxide.

……..

……

b. A student electrolysed molten zinc chloride. State the name of the product formed at:

i. the anode……..

ii. the cathode……..

Chapter five:- Rate of reactions

Multiple choice

1) Which of the following factors will not increase the rate of reaction between acids an metals?
A. Increasing temp
B. Using catalyst
C. Pressure
D. Concentration
2) The function of catalysts in a chemical reaction is
A. It ends rate of reaction
B. it makes new product
C. It lowers the activation energy
D. it lowers the energy of the product
3) When we increase one of the factors which effect a rate of reaction such as temperature the rate of reaction will
A. Decrease because of inversely proportional.
B. Increase because of direct proportional.
C. Remains constant because it doesn't effects.
D. None of the above
4) The pressure effects only
A. Fluids(Gases and liquids)
B. Gases
C. Solids
D. Only liquids
5) Collision theory states and occurs for
A. States that a chemical reaction takes place between particles when they collide to each other
B. Is physical and occurs between atoms
C. Is physical and chemical reaction
D. All of the above except A
6) Which one of the following increase rate of reaction in gas phase
A. Addition of catalysts
B. Decreasing pressure
C. Increasing temperature
D. Increasing volume
7) *Activation energy* is meant by
A. Maximum amount of energy need to end reaction
B. High concentration of energy
C. Minimum amount of energy that particles need in order to react with each other if the colliding.
D. None of the above
8) To calculate the rate of reaction we observe
A. Products
B. reactants
C. Time taken
D. A and B

9) When we make *haber process* the catalysts used is
A. Iron
B. Manganese
C. Vandium oxide(V_2O_5)
D. Iron oxide
10) For the reaction between calcium carbonate and dilute hydrochloric acid is

$$CaCO_3 + HCl \rightarrow CaCl + H_2O + CO_2$$

The factors will speed up the reaction is
A. Using for smaller pieces of calcium carbonate
B. Using for more dilute acid
C. Using large conical flask
D. Lower the temp of HCl acid
11) Which factors effect the initial rate of reaction?
1. The nature of reactants
2. The concentration of reactants
3. The size of solid reactant particles
A. 1 and 2 only
B. 1 and 3 only
C. 2 and 3 only
D. 1, 2 and 3(All)
12) Which of the following factors doesn't effects the rate of a chemical reaction
A. Color of the reactants
B. Particle size
C. Natural of the reactant
D. Temperature of the reactants
13) What effect does doubling the concentration of one of the reactants have on the rate of reaction?
A. Reaction will stop
B. It will have no an effect
C. Rate of reaction decrease
D. None of them
14) Which factors explains that potassium generally reacts faster than sodium?
A. Temperature
B. Surface area
C. Concentration
D. Nature of reactants
15) Which factor causes an increase in the rate of most reactions when the temperature is increased?
A. The reactant particles collide less
B. The reaction mechanism is changed efficiently
C. The reactant particles have more energy

D. None of the above

16) Substance that increase rate of reaction without being changed itself is called

A. Enzyme

B. Allotrope

C. Isotopes

D. Catalysts

Structural questions

1) Define

a. Rate

……

……

b. Rate of chemical reaction

……

……

c. Reactants

……

……

d. Products

……

……

e.

i. What is a catalyst?

……

……

ii. List the properties of catalysts

……

……

2) What do we observe happen to the rate of a chemical reaction in response to the following

i. An increase in temp.

……

……

……

ii. An increase in concentration.

……

……

iii. Why is a perishable food is kept in a refrigerator.

……

……

iv. When is a chemical reaction is fastest.

……

……

v. Why does the rate of chemical reaction slow down at the end.

……

……

……

vi. Write the major factors that influence the rate of reaction.

a. ……

b. ……

c. ……

d. ……

3) Ilayska togdher form three students formed two experiments to establish how effect MnO_2 was as catalys for the decomposition of hydrogen per oxide the result below where obtained by carry out this experiments with two different quantity of MnO the volume of gas produced the record against time.

Time(s)	0	30	60	90	120	150	180	210
Volume for 0.3gcm^3	0	29	55	79	98	118	133	146
Volume for 0.5gcm^3	0	35	84	118	162	162	174	182

a.Draw diagram of apparatus you could use the carry out this experiment

……..

……..

……

……

……

b. Plot graph of the result

……

……

……

……

……

c. At which stage does the reaction proceed most quickly

……

……

i. How can tou tell this from the graph you have draw

……

……

ii. In terms of particles, explain why the reaction is quickest at the point you have chosen in **i**.

……

……

d. Why does the slope of the graph become less steep as the reaction proceeds.

……

……

e. What volume of gas has been produced when using 0.3g of MnO after 50s

……

……

f.How long did it take for 60cm^3 of gas to be produced when using 0.5g Of MnO

……

……

……..

g. Write chemical balanced equation for the decomposition Hydrogen peroxide.

……..

……..

4) Classify rate of reaction according speed and how to measure?

……

……

……

……

5) An experiment was carried out to look at the reaction between Magnesium and hydrochloric acid

Mg+HCl⟶ MgCl+H_2

a. What would see when this reaction is taking place.

……

……

b. Give three ways in which the rate of reaction could increase.

……

……

……

6) Most of the chemical reactions that take place in living organisms involve enzymes

a. Explain the term ***Enzyme***

……

……..

b. Catalyse is an enzyme that is found in liver which can cause change in the decomposition of hydrogen per oxide. What effect you would expect if a piece of liver was placed in hydrogen per oxide solution.

……..

……

7) Explain why potatoes cooked in oil faster than those cooked in water.

……

……

……

8)

a. What occurs enzyme when above optimum temp and how to regain normal temp.

……

……

b. When become enzyme below optimum temp what take at that time and how to active enzyme.

……

……

……

c. list uses of enzyme

……

……

……

……

9)

a. Which of the following reaction mixtures will produce hydrogen more quickly at room temperature?

(i) zinc granules + dilute nitric acid

(ii) zinc powder + dilute nitric acid

……

……

b. Give an explanation of your answer to **a**.

……

……

c. Suggest two other methods by which the speed of this reaction can be altered.

……

……

10)

a. What apparatus would you use to measure the rate of reaction of limestone with dilute hydrochloric acid by measuring the volume of carbon dioxide produced?

……

……

b. The following results were obtained from an experiment of the type you were asked to design in question **10.**

Time (Min)	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Volume of CO_2 gas/cm^3	0	15	24	28	31	33	35	35	35	35	35

a. Plot a graph of the total volume of CO_2 against time.

……

……

……

……

……

……

……

b. At which point is the rate of reaction fastest?

……

……

c. What volume of CO_2 was produced after 1 minute 15 seconds?

……

……

d. How long did it take to produce 30 cm^3 of CO_2?

……

……

……

11) Dilute hydrochloric acid was added to excess calcium carbonate in a beaker.
The beaker was placed on a balance and the mass of the beaker and contents recorded every minute.
The results are shown in the table.

Mass of beakerAnd contents/g	184.0	178.0	175.6	174.6	174.0	174.0
Time/min	0	1	2	3	4	5

a. Plot the results on the grid and draw a smooth line graph.

……

……

……

……

……

……

……

……

b. Use your graph to determine the mass of the
beaker and contents after 30 seconds. Show clearly on your graph how you worked out your answer.

……

……

Time(s)	30	60	90	120	150	180	210	240	270
Absorbance	0.072	0.13	0.19	0.25	0.29	0.32	0.34	0.35	0.35

12) Solutions potassium iodide and potassium peroxide sulfate were mixed together and a clock started. A sample of the mixture was placed in the cell of a colorimeter and the absorbance measured at a suitable intervals. The results it shown in the table below.

a.Plot a graph of absorbance against time?

……

……

……

……

……

……

……

b. Find the rate of of the reaction

i.after 60s

……

……

……

ii. after 120s

……

……

Chapter six:- Organic chemistry(3&4)

Multiple Choice

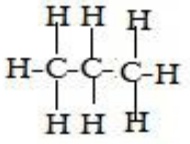
1) Which of the following is unsaturated hydrocarbon?
A. $CH_3CH = CHCH_3$
B. $CH_3CH_2CH_2CH_3$
C. $CH_3 - CH_2 - CH_2 - OH$
D. $CH_3 - CH_2 - COOH$

2) What is the name of the continuous chain alkane with six carbon atoms?
A. Butane
B. Pentane
C. Hexane
D. Heptane

3) Organic chemistry is the study of the chemistry of compounds of:
A. Carbon
B. Oxygen
C. Hydrogen
D. Polymer

4) A compound but-1-yne contains
A. All singe bonds
B. A double bond
C. A triple bond
D. A ring structure

5) What is this chemical formula represent



A. Butene
B. Butane
C. Propane
D. Propene

6) The homologous series which contains the above chemical formula is
A. Alkane
B. Alkene
C. Alcohol
D. Carboxylic acid group

7) Pick the formula that represents an alcohol
A. C_2H_6O
B. $C_2H_4O_2$
C. $C_2H_4CL_2$
D. $C_2H_2O_4$

8) Alkanes that contain 1 to 4 carbons atoms are in
A. Liquid state
B. Solid state

C. Gaseous state
D. Plasma state

9) If you built a model of ethane, how many bonds would you see
A. 1
B. 6
C. 7
D. 8

10) The functional group OH is found in compounds known as
A. Alkenes
B. Alcohol
C. Carboxylic acids
D. None of them

11) An alkane has a general formula of
A. C_nH_{2n+2}
B. C_nH_{2n}
C. C_nO_{n+2}
D. $C2_n2H_n$

12) Isomers are molecules with the same
A. Molecular formula but a differ overall charge.
B. Net dipole but differ atoms involved in the bond.
C. Kinds and number of atoms but a differ arrangement of these atoms.
D. Number of electrons and protons but a different number of neutrons.

13) Hydrocarbons are composed of:
A. Water and carbon
B. Modified carbohydrate compounds
C. Only carbon and hydrogen atoms
D. None

14) An example of a small-sized hydrocarbon is:
A. Methane
B. Octane
C. Wax
D. All

15) A hydrocarbon used in gas cylinders and which has 3 carbon atoms and all single bonds is:
A. Ethane
B. Propane
C. Decyne
D. Propene

16) Hydrocarbons combust in abundant oxygen to form:

A. carbon dioxide and carbon monoxide
B. smaller hydrocarbons such as methane
C. carbon dioxide and water
D. A and B

17) Which of the following two compounds belong to the same homologous series

A. C2H4 and C4H6
B. CH3COOH and HCOOCH3
C. C2H3Cl and CH4Cl2
D. C2H5OH and CH3OH

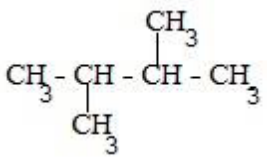
18) Organic molecules with the same molecular formula but different structural formulas are called

A. Allotropes
B. Isomers
C. Isotopes
D. Polymers

Structural questions

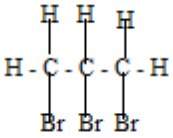
1) Name all these compounds

a.



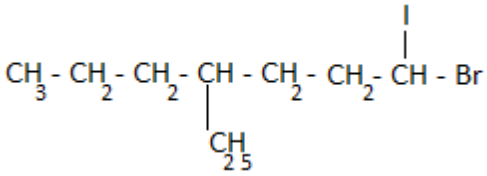
……

b.



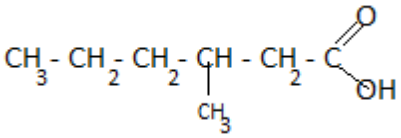
……

c.



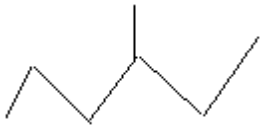
……

d.



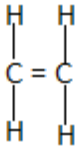
……

E.



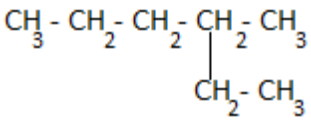
……

f.



……

g.



……

2) Most of the compounds in crude oil are hydrocarbons.
What is meant by the term **hydrocarbons**?

……..

……..

3) Complete this structure to show the part of the polymer formed from two molecules of C_3H_6

—C—C—C—C—

4) Alkanes can be converted into substances which are used as solvents. To do this the alkane is reacted with a halogen, such as chlorine, in the presence of ultraviolet light.

(i) Write a word and balanced chemical equation for the reaction between methane and chlorine.

……..

……..

(ii) Name the type of reaction taking place.

……

……

5) An industrial chemical company has supplies of ethene and ethanol.
The company considers using these two processes.
process 1 converting ethene to ethanol
process 2 converting ethanol to ethene
A chemical equation for process 1 is $C_2H_4 + H_2O \rightarrow C_2H_6O$
a. The equation for process 1 shows the molecular formulae of ethene and ethanol.
Draw the displayed formulae of ethene and ethanol.

i.Ethene

……..

……..

……..

ii. Ethanol

……..

……..

……..

b. Why is it correct to describe ethanol as saturated, but incorrect to describe it as a hydrocarbon?

……..

……..

……..

6) But-1-ene is a member of the homologous series of alkenes.
Draw the displayed formula of but-1-ene.

……..

……..

……..

……..

b. State what is meant by the term **isomers**.

……..

……..

c. Using your knowledge of the reactions of ethene, complete the chemical equation to show the formula of the organic product.

(i) The reaction between but-1-ene and steam. $CH_2 = CHCH_2CH_3 + H_2O \rightarrow$……..

Chapter seven:- Atomic structure

1]Multiple choice

1) Which of the following is electronic configuration of in nitrogen atom

A.$1s^2, 2s^2, 2p^5$ C.$1s^2, 2s^4, 2p^5$

B.$1s^2, 2s^2, 2p^4$ D.$1s^2, 2s^2, 2p^3$

2)The atomic radius of main group elements generally increases down a group because

A. Effective nuclear charge decreases down a group

B. Decrease in number of shells

C .Increase in effective nuclear charge

D. The principle quantum number of valence orbital's increases

3) The table below shows the atomic number of four elements

Element	W	X	Y	Z
Atomic number	9	11	17	19

Which statement about the elements stated above is correct

A. X is more reactive than Z

C. W is more reactive than Y

B. W is metal

D. X and Z are in same period

4) The table below indicates the electronic structure of three elements

Element	Electronic configuration
R	2 ,8 ,6
X	2 ,8 , 7
Y	2 ,8, 8

ii) Which statement is correct

A. All elements have same period

C. All elements have same number of shells

B. A and B correct

D. None the above

ii) By using periodic table by their electronic configuration respectively their relative molecular mass is

A. 35.5 ,32 ,39.9

C.32 ,35.5 ,39.9

B. 39.9 ,32 ,35.5

D. None the above

5) The elements which are lay P block are the following except

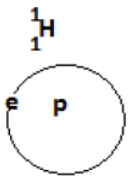
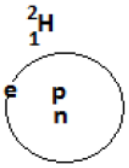
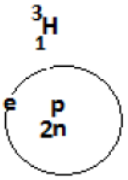
A. Metals

B. Metalloids

C. Transition metals
D. Group 3,7 and group O.
6) Which of the elements has largest atomic radius
A. Carbon
B. Silicon
C. germanium
D. Tin
7) Pauli exclusion principle states
A. Each orbital can hold three or more electrons
B. Each orbital can hold two electrons
C. Unpaired electrons are placed in orbitals at lower energy
D. Electrons must be placed before the pair of electrons
8) D orbital can bear
A. 4 electrons
B.9 electrons
C. 10 electrons
D. 5 electrons
9) The lactinide and actinide elements are included in block
A. S-block
B. P-block
C. D-block
D. F-block
10) In period three there is ---------- conditions ionization energy decreases
A. Three
B. Four
C. Two
D. None the above
11) Ionization energy is
A. Energy required to get an electron in hot metal surface
B. Energy required to get an electron from an atom
C. Energy required to get an 1^{st} electron from an ion
D. Energy required to get an electron from compound
12) All of the following are factors influence ionization energy except
A. Atomic radius
B. State of an element
C. Shielding effect
D. Effective nuclear charge
13) Element *P* is in group *one* and period *3* of periodic table. What is its configuration?
A. 2, 8,1
B. 2, 8, 8, 1

C. 2, 8, 8, 2
D. 2, 1
14) What is an isotope?
A. Atoms of same element with same atomic number but different mass number B. Element with the same mass number
C. Element existing in two or more different forms in the same physical state
D. Element with the different atomic number.
15) The symbol for an ion of oxygen is represented as:

A. O^{-}
B. O^{2-}
C. $\square_{2}$
C. $\square^{2+}$
D. O_{2+}
16) An element T with atomic number 13 belongs to?
A. Group 1, Period 3
B. Group 3, Period 1
C. Group 2, Period 3
D. Group 3, Period 3
17) Which of the following has the lowest ionization energy
A. Na
B. K
C. Rb
D. Cs
18) The electronic configuration of magnesium ion ,Mg^{2+},is
A. $1s^2 2s^2 2p^6$
B. $1s^2 2s^2 2p^6 3s^2$
C. $1s^2 2s^2 2p^6 3s^1$
D. $1s^2 2s^2 2p^6 3s^4$
19) A pure substance that cannot be chemically decomposed is called?
A. A compound
B. An isotope
C. An element
D. A mixture
20) In this diagram indicates three hydrogen difference it represent
A. Iso-tone
B. Isobar
C. Isotope
D. All of them

Protium	Deuterium	Tritium
 Most hydrogen atoms have one proton and one electron, but no neutrons.	 ..But 15 in every 100 000 a have one neutrons. It is called **Deuterium**	 And a very tiny number have two neutrons. And is called Tritium, it is unstable.

21) The electron configuration of the phosphide ion ($\square^{3-}$)is
A. [Ne]$3s_2$
B. [Ne]$3s_23p_1$
C. [Ne] $3s_23p_3$
D. [Ne]$3p_2$
E. [Ne]$3s_23p_6$
22) Elements which its last electronic configuration lasts in D orbital are in group
A. group one and two
B. group 3 to group eight
C. Transition metals only
D. Lactinade and actinide
23) Atomic radius generally increase as we move
A. Down a group and from left to right across a period
B. Down a group and from right to left across a period
C. Up a group and from right to left across a period
D. Up a group and from left to right across a period
24) Identify the group whose atoms form ions with a charge of +1.
A 1
B 2
C 6
D 7
25) Substances can be elements, compounds or mixtures.
a) Which of these is a correct symbol for an element?
A. He
B. H_2
C. H_2O
D. H_2O_2
b) Which of these substances is a compound?
A. air
B. hydrogen
C. oxygen
D. water
26) Properties in which isotopes differ are
A. Chemical
B. Physical
C. Electrical

D. None

27) Which atom has the least atomic radii?

A. Se

B. F

C. K

D. Be

28) Pathway of electron is called

A. Orbit

B. Electric path

C. Orbital

D. Axis

29) You need to refer to a copy a periodic table to answer this question.

Which one of the following electronic structures does not represent a noble gas.

A. 2,8

B. 2

C. 2,8,18,8

D. 2,8,8,2

30) Which one about the statements about an atom with an ***Atomic number of 17*** and a ***Mass number of 35*** is wrong.

A. The atom is an isotope of chlorine

B. The electronic structure is 2,8,7

C. The atom contains 17 neutrons

D. Its an isotope of the same element as one with an atomic number of 17 and a mass number of 37.

31) How many electrons are there in the outer level of strontium atom. The atomic number of Strontium is 38.

A. 2

B. 4

C. 6

D. 8

32) The table shows the numbers of particles in two atoms, L and M.

	Atom L	Atom M
number of electrons	6	6
number of neutrons	8	6
number of protons	6	6

a) Which particles are present in the nuclei of both atoms?

A. electrons and neutrons

B. electrons and protons

C. neutrons and protons

D. neutrons, protons and electrons

b)
(i) The atomic number of atom L is .....

(ii) The mass number of atom L is .....

C) Atoms *L* and *M* are neutral because
A. the numbers of electrons and neutrons are equal
B. the numbers of electrons and protons are equal
C. the numbers of neutrons and protons are equal
D. the numbers of electrons, neutrons and protons are equal

d) The electronic configuration or structure of atom *M* is
A. 2,2,2
B. 2,4
C. 2,4,6
D. 4,2

Structural questions

1) Give two general differences between mixtures and compounds?
……

……

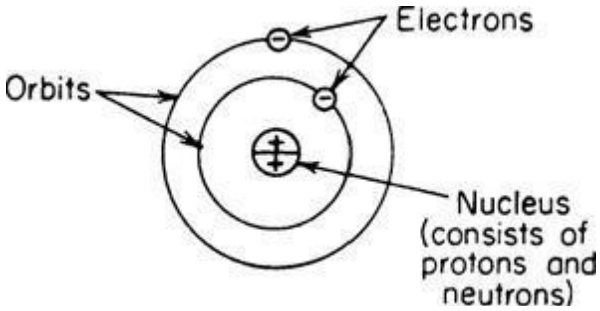
……
A) The symbols for iron and sulfur are $^{56}_{26}\mathrm{Fe}$ and $^{32}_{16}\mathrm{S}$ use this information to state
(i) the number of protons in an atom of iron ……
(ii) the number of neutrons in an atom of iron ……..
(iii) the electron configuration of an atom of sulfur …….

B) Iron is composed of different atoms called 'isotopes'. What does this mean?
……

2) Two of these atoms are $^{20}_{10}\mathrm{Ne}$ ☐☐☐ $^{22}_{10}\mathrm{Ne}$
i) What term is used to describe such atoms? …….
ii) How do these two atoms differ from each other?

……

3) By using the diagram below which deals the structure of an atom answer following questions



A.

i) What is an Atom?

……

……

ii) What are the two parts that are collectively known as Nucleons?

……..

……

iii) What are the parts responsible for mass of an atom?

……

……

iv) Write three fundamental particles of an atom?

…… …… ……

i) At what time the atom is neutral?

……

……..

ii) What is called the total number of protons and neutrons in the nucleus?

……

……

C. By exampling the calcium ($^{40}_{20}\mathrm{Ca}$) answer the limit questions about this atom?

i) Atomic number. ……..

ii) Mass number. ……

iii) Proton number. ……

iv) Electron number. ……,,

v) Neutron number. ……...

vi) Write down electronic configuration of calcium in S,P,D,F notation?

……

……

D.

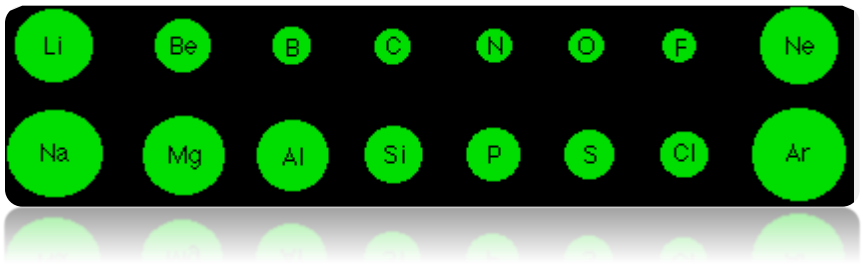
i) Name a particle whose its charge is

(a) Positively charged ……

(b) Negatively charged ……

(c) Zero charge ……

4) The diagram below shows atomic radius



A]

i) Define Atomic radius?

……

……

ii) What happened atomic radius across a period?

……

B] Highlight the main effect which effects atomic radius?(Explain how it effects) ?

……

……

……

C. What is used for

Metallic radius ……..

ii) Covalent radius. ……

D. When an element loses electrons and shells disappeared

i) What happened ionic radius?

……

ii) Compare three elements for your answer (i)?

……..

……

……

5) Define

i) Atomic radius

……

……

ii) Ionic radius

…… ……..

iii) Ionization energy

……..

……..

6) <u>This table shows a part of periodic table.</u> (This periodic table isn't consist hydrogen and helium).

															F		
Na															Cl	Ar	
K					Mn										Br		

A. Complete the following sentence.
The elements in the Periodic Table are arranged in order of
…… .

…… ……..

B. Name an element shown in the diagram that is:
(i) a metal
……
(ii) a halogen
……
(iii) a transition metal
……
(iv) a noble gas
……
C.
(i)Name two elements that are same properties
……

……
(ii) What are they form in positive charge or negative charge
……
(iii) Name three elements that are same period
……

D. The electronic configuration of Manganese(Atomic number of 25)
(I) Write down
Electron structure ……

Spdf Notation……

Electrons in box form
……

……
……

……

……
(ii)In which group and period does manganese belong in
group……

period……

Block it include ……
E. The electronic configuration of Argon (Atomic number of 18)
(I) Write down

Electron structure ……

Spdf Notation……

Electrons in box form
……

……

……

……
(ii) In which group and period does argon belong in

group……

period……

Block it include……

7) Complete the following table

Name of element	Atomic number	Electronic configuration
……..	25	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$
Magnesium	12	……..
Chlorine	……..	$1s^2 2s^2 2p^6 3s^2 3p^5$

Which of the elements in the above table belongs to the
a. D-block of the periodic table …….

b. P-block of the periodic table …….

8) What is an orbital? …….

……
a. Auf Bau principle states that electrons are placed in orbital at lower energy what does this two principles state
i} Pauli exclusion principle ……

……
ii} Hand's rule
……

……
b. Write down electronic configuration(in SPDF) of
i} Oxygen(O)
……

……
ii} Silver(Ag) as Kr …….

……

iii} Bromine ion(Br^{-1}) as Ar …….

……

iv} Copper(Cu) …….

……

v. Chromium(Cr) ……

……

c. Why copper and chromium has one electron in their 4s orbital?
……

……

d. Why 4s orbital are filled before 3d orbital?
……

……
f. Complete the table below to show how many electrons completely fill each of the following

Orbital	**Electrons can carry**
D orbital	……
S orbital	……
F orbital	……...

9) The electronic configuration of an atom of element X. is (2,8,2).
(a)
i. How many protons does the nucleus of the atom contain?
……

……

ii. Which group of the Periodic Table contains element X? Give a reason for your choice.
……

……

iii. Which period of the Periodic Table contains element X? Give a reason for your choice.
……

……
iii. Give the formula of the ion formed by element X in its compounds.
……

……

10) Another type of lithium atom has atomic number 3 and mass number 7.
i. State the name given to atoms with the same atomic number but different mass numbers.
……

……

ii. Draw a diagram to show the arrangement of electrons in an atom of lithium with atomic number 3 and mass number 7.
……

……

……

……

……

……

11) a. Define the terms: proton, neutron and electron.
……

……

……

……

b**.** An atom **X** has a proton number of 19 and relative atomic mass of 39.
(i) How many electrons, protons and neutrons are there in an atom of **X**?
……

……

(ii) How many electrons will there be in the outer energy level (shell) of an atom of **X**?
……

……

(iii) What is the electronic configuration of **X**?

……

……

12) The table below shows the elements in a period of the Periodic Table.

Li	Be	B	C	N	O	F	Ne

a. To which period of the Periodic Table do these elements belong?

……

……

b. Answer these questions using only the elements shown in the diagram. Each element can be used once, more than once or not at all.
Write down the symbol for the element which

(i) has six electrons in its outer shell.

……

(ii) is a halogen.

……

(iii) is a metal which reacts rapidly with cold water.

……

(iv) has two forms, graphite and diamond.

……

(v) is in Group II of the Periodic Table.

……

(vi) makes up about 80% of the air.

……

c. Complete the following sentence choosing words from the list below.

Atoms, electrons, molecules,
Neutrons, protons

The …… of the elements in the Periodic Table are arranged in order of increasing number of …….

Chapter eight:- Mole and stochiometry

Multiple choice

1) How many moles are there in 35g of PCl_3

A. $0.25\ MOL$
B. $0.52\ MOL$
C. $0{\cdot}18\ MOL$
D. NONE

2) How many grams of $0{\cdot}250\ moles\ of\ NaOH$
A.11g
B.$10.1g$
C.10g
D.9g

3) Calculate The percentage mass of iron in$(Fe_2(SO_4)3)$
A. $20\,^0/_0$
B. $26\,^0/_0$
C. $28^0/_0$
D. $30^0/_0$

4) Calculate the number of moles in H_2SO_4 Solution And it is mass is 196g
A. 2.50 mol
B. 2 mol
C. 3 mol
D. None

5) Calculate the percentage Mass of oxygen in water
A. $89^0/_0$
B. $84^0/_0$
c.$86^0/_0$
D. None

6) The percentage of the water in copper(II) sulphate crystals, $CUSO_4.5H_2O$ is
(Atomic mass CU=63.5, S=32, O=16, H=1)
A. 65%
B. 36%
C. 10%
D. 58%

7) What is the relative molecular mass of water?
A. 18

B. 32
C. 23
D. 9

8) How many molecules are there in 0.5 moles oxygen gas
A. 4.01×10^{23}
B. 3.01×10^{23}
C. 3.5×10^{23}
D. 4×10^{23}

9)The equation of the reduction of iron ore in blast furnance is $Fe_2o_3 + 3CO \rightarrow 2Fe + 3CO_2$ when 80 tonnes of iron ore is reduced in 28 tonnes of iron were produced calculate the percentage purity of iron ore
A. $25^0/_0$
B. $50^0/_0$
C. $30^0/_0$
D. $40^0/_0$

10) Calculate the number of moles of carbon atom contained in 6 grams. *(C=12)*
A.0.5 mol
B.72 mol
C.5.0 mol
D.120.0 mol

11) When a reaction of **Fe+** $\boldsymbol{Cl_2 \rightarrow FeCl_3}$ When this reaction is balanced the coefficient of **Cl** will be
A. 1
B. 2
C. 3
D. 4

12) What is the molar mass of magnesium chloride?
A. 46g/mol
B. 59.76g/mol
C. 95g/mol
D. 94glmol

13) What is the molarity of 9.8g of sulphuric acid $\{\boldsymbol{H_2SO_4}\}$ dissolved in 250cm^3 of water?
A. 0.2M
B.0.25M
C. 0.04M
D. 0.50M

14) The percentage of mass of carbon in one molecule of carbon dioxide is *(C=12,O= 16)*
A. 30%
B.37.5%
C. 40 %
D. 50%

15) At stp one mole of any gas can occupy a volume of
A. $20dm^3$
B. $24dm^3$
C. $22.4dm^3$
D. $30dm^3$
16) If 2.8g sample of an alkene adds 0.2g of hydrogen what is the formula of the alkene?
A. C_2H_4
B. C_2H_3
C. C_3H_4
D. None
17) Number of atoms or molecule present in one molar mass of an entity is known as:-
A. Atomic number
B. Mass number
C. Bohr number
D. Avagodro,s number
18) Empirical formula of benzene is similar to
A. Water
B. Hydrogen peroxide
C. Glucose
D. glycerin
19) Moles defined as mass of an element divided by
A. Atomic mass
B. Molecular formula
C. Empirical formula
D. Molar mass
20) Mass of one molecule of sulphuric acid is
A. 96g B. 86g
C. 98g D. 88g

Structural questions

1) Find the empirical formula of the following

A] C_2H_4

……

……

B] $C_{11}H_{22}O_{11}$

……

……

C] $C_{25}H_{50}$

……

……

2) Relative atomic masses of O is 16 and C is 12 and avagador's constant is 6.02×10^{23} particles per mol

A] What is the formula of carbon dioxide?

……

……

B] What is the bond between carbon and oxygen?

……

……

C] How many grams of carbon dioxide are contained in 1 mole?

……

……

…….. Mass…….g

D] How many grams of carbon dioxide are contained in 0.5 mole?

……

……

Mass ……..g

……

E] How many grams of carbon dioxide are contained in 2 mole?

……

……

Mass ……..g

F] How many molecules of carbon dioxide are contained 1 mole?

……

……

N. molecules……..

G] Measured in R.T.P what is the volume of 1 mole of carbon dioxide?

……

……

Volume ……..

H] Measured in R.T.P what is the volume of 22g of carbon dioxide?

……

……

volume ……..

I] How many moles of carbon dioxide are contained in 88g?

……

……

N.moles……..mol

j] How many grams of carbon dioxide are contained in 3 moles?

……

……

Mass ……..g

3)

a. A 10.01g of white solid contains 4.01g of Ca ,1.20g of C, and 4.80g of O find the Empirical formula?

……

……

……

……

Empirical form:- ……

b. What is the empirical formula of a compound that is 40% sulfur and 60% of oxygen by weight or mass?

……

……

……

……

Empirical form:- ……

c. Find empirical formula of compound which contain 22% of carbon , 4.6% of hydrogen and 73.4% of bromine?

……

……

……

……

Empirical form:- ……

d. A sample of a chlorofluorocarbon (CFC) contains 0.24 g of carbon, 0.38 g of fluorine and 1.42 g of chlorine.

a) Show by calculation, that the empirical formula of the CFC is $CFCl_2$

……

……

……

……

…… Empirical formula……

e. What is meant by the term ***empirical formula***?

……

……

4) Calculate the mass of 2 mole in the following equations

A] Br_2

……

……

……

Mass ……g

B] Al(NO_3)

……

……

……

Mass ……g

C] C_4H_8

……

……

……

Mass ……g

D] CH_4

……

……

……

Mass ……g

E] ZnCO_3

……

……

……

Mass ……g

5) Define each of the following

A) Mole

……

……

B) Stochiometry

……

……

C) Concentration solution

……

……

6) How many methods are used to balance equations and outline?

……

……

7) Define

A] Empirical formula

……

……

B] Molecular formula

……

……

8) Balance this equations. By using inspection and L.C.M methods

A) $N_2 + H \rightarrow NH_3$

……

……

B) $CO_2 + H_2O \rightarrow C_6H_{12}O_6$

……

……

……

C) $MgBr_2 + 2AgNO_3 \rightarrow MgNO_3 + 2AgBr$

……

……

……

D. NaI(s)+ Br_2(g) → NaBr(s)+ I_2(g)

……

……

……

E. Fluorine and aluminum to form aluminum Fluoride

……

……

……

F. Lithium with oxygen to form lithium oxide

……

……

……

9) How many moles of N_2 are required to form 30 moles of NH_3

……

……

……

……

……

N. of moles…….mol

10) A 0.84g of hydrocarbon x is completely formula of burned to produce 2.64g of carbon dioxide and 1.08g of water what is the empirical hydrocarbon x ?

……

……

……

……

……

…… Empirical formula……

11) A hydrocarbon has the following percentage composition by mass.
C = 87.26% H = 17.24%
(i) Calculate the **empirical** (simplest) formula of this compound?

……

……

……

……

…… E.f……

(ii)If the relative molecular mass of the compound is 58, find its **molecular** formula*(Actual)*?

……

……

……

……

……

…… Molecular formula……

12)

(a)6.0g of magnesium burns completely in oxygen according to the following equation.

$2Mg + O_2 \rightarrow 2MgO$

(i) Calculate the number of **moles** of magnesium in 6.0g of magnesium.

……

……

……

……

……N.of mol …..mol

(ii) How many moles of magnesium oxide would be formed?

……

……

……

……

…… N.of mol……mol

(iii) Calculate the mass of magnesium oxide formed?

……

……

……

……

…… Mass…….g

(b) Calculate the number of moles in a grams of 5.4g at $CaCO_3$?

……

……

…… Mass…….g

13) Given:- Relative Atomic Masses of Na = 23, O = 16 and C = 12

a. How many grams of sodium carbonate are contained in:

I. 500cm^3 of 1M solution?

……

……

……

……

…… Mass…….g

II. 1500 cm^3 of 0.25M solution ……

……

……

……

…… Mass…….g

b. How many moles of sodium carbonate are contained in:-

I. 1060 g of the solid?

……

……

……

……

…… N.of mol…..mol

II. 1000cm^3 of 1M solution? ……

……

……

……

……N.of mol…..mol

III. 1000$cm^3$of 0.55M solution?

……

……

……

……

……N.of mol…..mol

IV. 285$cm^3$of 0.55M solution? ……

……

……

……

……N.of mol…..mol

14) What is the empirical formula of a compound that contains 0.783g of carbon, 0.196g of hydrogen and 0.521g of the oxygen?

……

……

……

……

…….. Empirical formula……...

15) What is empirical formula if compound consists 21.2% N, 6.1%H, 24.2%S and 48.5%O?

……

……

……

……

…… Empirical formula ……

16)

A. Octane is a member of the alkane family. Its percentage composition is 84.2% of carbon 15.8% of hydrogen. Its formula mass is 114g. What is its molecular formula?

……

……

……

……

……Molecular formula ……..

B. Compound has empirical formula CH2 and has mass of 84g. find its molecular formula?

……

……

……

……

……Molecular formula…….

17) Calculate the volume?

A. 4 mol/dm^3 solution contains 2 moles?

……

……

……

……

…… Volume…….. dm^3

B. 6 mol/dm^3 solution contains 0.03 moles?

……

……

……

……

…… Volume…….. dm^3

c. The equation for the reaction is

$Cr(s) + 2HCl(aq) \rightarrow CrCl_2(aq) + H_2(g)$

A student adds 0.13 g of a sample of chromium metal to excess dilute hydrochloric acid.
(i) Calculate the maximum volume of hydrogen gas that the student could produce in this experiment at room temperature and pressure (rtp). [molar volume of a gas is 24dm^3 at ***rtp***]

……

……

……

……

…… Volume…….. dm^3

D. A reaction produces 100cm^3 of hydrogen at *rtp*. How many moles of H_2 is this?

……

……

……

……

…… N. mol ……

19) (a) A student made a solution of sodium hydroxide by dissolving 10.0 g of solid sodium hydroxide in distilled water to make 250 cm_3 of solution.
(i) Calculate the amount, in moles, of NaOH in 10.0 g of sodium hydroxide.
……

……

……

……

……

N.of moles……mol

(ii) Calculate the concentration, in mol/dm_3, of this solution of sodium hydroxide.
……

……

……

……

……

……

concentration = . ……

(b) Sodium hydroxide reacts with carbon dioxide.
The equation for this reaction is $2NaOH + CO_2 \rightarrow Na_2CO_3 + H_2O$
A solution of sodium hydroxide of concentration 2.00 mol/dm^3 is used.
Calculate the amount, in moles, of sodium hydroxide in 200 cm^3 of this solution.
……

……

……

Amount of sodium hydroxide = …… mol

20) A sample of lithium contains 92.5% of atoms with mass number 7 and 7.5% of atoms with mass number 6. Calculate the relative atomic mass of lithium.

……

……

……

relative atomic mass =……

21) Lithium fluoride, LiF, and magnesium oxide, MgO, are ionic compounds.
(a) Calculate the relative formula mass (M_r) of MgO.

……

……

……

M_r =……

(b) Calculate the relative formula mass of $Ca(OH)_2$

……

……

……

M_r =……

22) State what is meant by the term **relative atomic mass, A_r**

……

……

a) A sample of carbon contained 98.90% carbon-12 and 1.10% carbon-13.
Use this information to calculate the relative atomic mass of carbon in the sample.

……

……

……

……

Relative atomic mass ……

23)

a. $^{69}_{31}Ga$ **and** $^{71}_{31}Ga$ are isotopes of gallium.

With reference to this example, explain what you understand by the term isotope.

……

……

b. A sample of gallium contains 60% of atoms of $^{69}_{31}Ga$ **and**40% of atoms of $^{71}_{31}Ga$

Calculate the relative atomic mass of this sample of gallium.

……

……

……

……

Relative atomic mass ……

24) Calculate the mass of:

a. 1 mole of:

(i) chlorine molecules

……

……

……

(ii) iron(iii) oxide.

……

……

……

Mass of (i)…….g and Mass of (i)…….g

b. 0.5 mole of:

(i) magnesium nitrate.

……

……

……
(ii) ammonia.
……

……

……

Mass of (i)…….g and Mass of (ii)…….g

25) Calculate the number of moles of gas present in the following:
a. 36 cm^3 of sulfur dioxide
……

……

……

N.mol……. mol

b. 144 dm^3 of hydrogen sulfide.
……

……

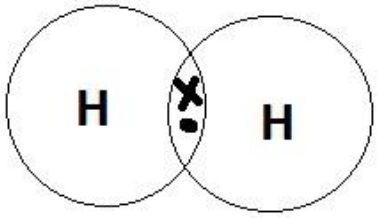
……

N.mol……. mol

Chapter nine:-Chemical bonding and structure

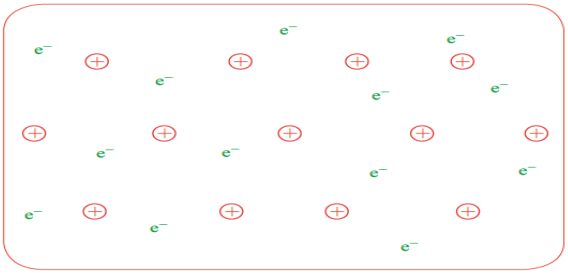
Multiple choice

1) What type of bond occurs when there is transferring of electrons?
A. Ionic bond
B. Metallic bond
C. Hydrogen bond
D. Covalent bond
2) An ion bond is always formed with some covalent character, when
A. the electrons are not equally shared
B. there is a degree of electron transfer
C. the electron transfer is complete
D. there is a degree of electron sharing
3) By using a diagram below the bond between the two hydrogen is



A. Hydrogen bond
B. Permanent dipole-dipole force
C. Ionic bond
D. Covalent bond
4)The correct order for the strength of these of bonds are :
a. Covalent > Vander Waal's > hydrogen
b. Hydrogen> Covalent> Vander Waal's
c. Vander Waal's> Hydrogen> Covalent
d. Covalent> Hydrogen> Vander Waal's
5) A molecule with a single covalent bond is
A. Co_2
B. Cl_2
C. Co
D. N_2
6) Which of the following molecule is ionic
A. C_3H_8
B. HBr
C. $NaNO_3$
D. SIO_2

7) Which type of bond is formed when two atoms of chlorine combine?
A. Ionic
B. Covalent
C. Metallic
D. None
8) Which bond does this figure represent



A. Ionic bond
B. Covalent bond
C. hydrogen bond
D. Metallic bond
9) Which of the following is an iomic bond?
A. N_2O
B. HCl
C. CO
D. Na_2O
10) Dative covalent bond is found in
A. Ammonium ion
B. Ammonia
C. Nitrogen
D. Urea
11) Molecule with the bond of shape trigonal pyramid is
A. H_2O
B. CO_2
C. NH_3
D. BF_3
12) Tetra Chloromethane is a
A. Polar
B. Non polar
C. Reactive
D. Non reactive
13) Number of bonding pairs of electrons in water is:-
A. 1
B. 2
C. 3
D. 4
14) Vander waal,s forces are directly proportional to the
A. Pressure
B. Electro negativity

C. Temperature
D. Boiling point
15) Which one of the following describes what happens when *sodium* combines *oxygen* to form sodium oxide, an ionic compound.
A. Two sodium atoms combines for one oxygen atom
B. Two oxygen atoms combines for one sodium atom
C. One oxygen and one sodium react to form sodium oxide
D. None of the above
16) Graphite ……
A. Conduct electricity due to large distance between atoms of carbon
B. Doesn't conduct electricity due to strong force between atoms of carbon
C. Is a dense material
D. Both A&C
17) Number of bonding pairs of CO_2 is
A. 1
B. 2
C. 3
D. 4
18) Simple molecules or giant macromolecules are examples of
A. Ionic bonds
B. Covalent bonds
C. Metallic bonds
D. Dative bonds
19)……is a tendency of anions to be polarized by the cations.
A. Polarization
B. Polarity
C. Polarization power
D. None of the above
20)……..forms when hydrogen atom sand witched between two very high electron atoms.
A. Venderwaals force
B. Hydrogen bond
C. Permanent dipole-dipole force
D. Both A & B
21) A poor conductor of electricity is a characteristic of
A. Covalent bonds
B. ionic bonds
C. metallic bonds
D. dative covalent
22) When an electron pair is shared between two atoms of unequal electronegativity
A. A non polar covalent compounds formed
B. A polar covalent compounds formed
C. Metallic bond formed
D. There is a degrees of transferring electrons
23) Bonds which involve two shared electron pairs are
A. Single bond B. Double bond C. Triple bond D. All of the above

24) In which statement is correct

✓ it conducts ✗ Doesn't conducts

Type of bonding	Electrical conductivity		
	Solid	Liquid	Gas
A.Metallic	✓	✗	✓
B. Covalent	✗	✗	✓
C. Ionic	✗	✓	✓
D. None	✗	✗	✗

25) In general electronegativity……up a group from down to top.

A. Increase
B. Decrease
C. Constant (doesn't change)
D. None of the above

Structural questions

1)When lithium is burned in air, the two compounds lithium oxide (Li_2O) and lithium nitride (Li_3N) are formed. Both compounds are ionic and their ions can be represented by dot and cross diagrams.

(a) Draw a dot and cross diagram for the ions in lithium nitride

……

……

……..

……..

b) The chemical equation for the reaction between lithium and oxygen is

$$4Li + O_2 \rightarrow 2Li_2O$$

Write a chemical equation for the reaction between lithium and nitrogen.

……

……..

……..

2) Lithium fluoride, LiF, and magnesium oxide, MgO, are ionic compounds.

a) What term ionic compounds mean?

……..

……..

……..

b) Explain why

• ionic compounds have high melting points

……..

……..

……..

• the melting point of magnesium oxide is much higher than the melting point of lithium fluoride

……

……..

……..

c) Explain why ionic compounds do not conduct electricity when solid, but do conduct electricity when molten or in aqueous solution.

……

……..

……..

……..

3) Study the part of periodic table

																F	
Na																Cl	
K																Br	

A..

(i) Name **two** elements in the diagram that react together to form an ionic compound.

..... and .....

(ii) Draw a dot and cross diagram for the ions in the compound formed in (A)(i).
Show only the outer electrons. Include the charge on each ion.

……..

……..

……..

……..

……..

……..

……..

4)

a. For each of the substances given complete the table by giving the type of the bond and structure.

Substance	Type of bond	Structure
1. Carbon dioxide		
2. Water		
3. Carbon(diamond)		
4. Sodium chloride		

b. Using dot{.} and cross{×} to represent electrons.
Draw a diagram to show the bonding in
i. Carbon dioxide

……

……

……

……..

ii. Water

……

……

……..

……..

5) Atoms of elements **X**, **Y** and **Z** have 16, 17 and 19 electrons, respectively. Atoms of argon have 18 electrons.

a. Determine the formulae of the compounds formed by the combination of the atoms of the elements:
(i) **X** and **Z**
……..

……..

(ii) **Y** and **Z**
……..

……..

(iii) **X** with itself.
……..

……..

b. In each of the cases shown in **a(i)–(iii)** above, name the type of chemical bond formed.
……..

……..

c. Give two properties you would expect to be shown by the compounds formed in **a(ii)** and **a(iii)**.
……..

……..

6) The elements sodium and chlorine react together to form the compound sodium chloride, which has a giant ionic lattice structure.
a. What type of structure do the elements
(i) sodium and **(ii)** chlorine have? ……..

……

b. Draw a diagram to represent how the ions are arranged in the crystal lattice of sodium chloride.
……..

……

……..

……
c. Explain how the ions are held together in this crystal lattice.
……..

……

d. Draw diagrams to show how the electrons are arranged in a sodium ion and a chloride ion. (The proton numbers of sodium and chlorine are 11 and 17, respectively.)

……

……

……

……..

e. Make a table showing the properties of the three substances sodium, chlorine and sodium chloride. Include in your table:
(i) the physical state at room temperature
(ii) solubility in (or reaction with) water
(iii) colour
(iv) electrical conductivity. ……

……

……

……

……

……

7) Draw diagrams to show the bonding in each of the following compounds:
a. calcium fluoride (CaF_2) ……

……

……

b. oxygen (O_2)
……

……

……

c. magnesium chloride ($MgCl_2$) ……

……

……
d. tetrachloromethane (CCl_4). ……

……

……

8)

a.The list describes five types of chemical structures.

giant covalent
giant ionic
metallic
simple atomic
simple molecular

i.……it consists lattice of positive ions each surrounded in a regular

ii. ……. it consists by a positively charged metal ions hold together by a cloud deloclized electrons.

iii. ……have exceptional properties such as hardness and density.

iv. ……they doesn't conduct electricity due to lack of free ions and have low M,p and B.p.

v. ……..are small simple atomic structure.

b. Sodium chloride is an ionic solid. Complete the following sentences using words from the list.

Electrons, ionic, molecular, molten, solid

Sodium chloride does not conduct electricity when it is a …… because the ions cannot move.

When it is …… sodium chloride does conduct electricity because the ions are free to move.

9) The following is a list of the electron distributions of atoms of unknown elements.

Element	Electron distribution
A	2,5
B	2,8,4
C	2,8,8,2

D	2,8,18,8
E	2,8,18,8,I
F	2,8,18,18,7

a.Choose an element from the list for each of the following descriptions.

(i) It is a noble gas.

……

(ii) It is a soft metal with a low density.

……

(iii) It can form a covalent compound with element **A**.

……

(iv) It has a giant covalent structure similar to diamond.

……

(v) It can form a negative ion of the type X^{-3}

……

b. Elements ***C*** and ***F*** can form an *ionic compound.*

(i) Draw a diagram that shows the formula of this compound, the charges on the ions and the arrangement of the valency electrons.

……

……

……

……

……

……

10) There are three types of giant structure – ionic, metallic and macromolecular.

a. Sodium nitride is an ionic compound.

Draw a diagram that shows the formula of the compound, the charges on the ions and the arrangement of the valency electrons around the negative ion.

Use x to represent an electron from a sodium atom and use dot(o) to represent an electron from a nitrogen atom.

……

……

……

……

……

b
i. Describe metallic bonding.
……

……

ii.Use the above ideas to explain why: metals are good conductors of electricity, metals are malleable.
……

……

……

11) The table shows the names of some substances. It also shows whether each substance is an element or a compound, and the type of bonding in the substance.

Complete the table. One example of each has been done for you.

Substance	Element or compound	Type of bonding
Ammonia		
hydrogen chloride	compound	
Oxygen		covalent
magnesium oxide		

12) Define the following
a. Intermolecular force and least its types
……

……

……

b. Intramolecular force and least its types
……

……

……

c. Polarity

……

……

d. Electronegativity

……

……

Chapter ten:- Energy in chemistry

Multiple choice

1)An exothermic reaction
A. Heat is gaining
B. Heat is losing
C. Is used for catylsts
D. None

2) When we add sodium into water the reaction take in place is
A. Endothermic reaction
B. Substitute reaction
C. Exothermic reaction
D. None

3) When hydrochloric acid is added in potassium hydroxide in a beaker the temperature rises so reaction is

$$HCl + KOH \rightarrow KCl + H_2O \qquad \Delta H = -70KJ$$

1. Exothermic *2. Endothermic* *3. Neutralization*

A. 1 and 2 only
B. 1 and 3 only
C. 2 and 3 only
D. 1, 2 and 3(All)

4) Chemical reaction that gives off energy is
A. Endothermic and *OH* positive
B. Exothermic and *OH* negative
C. Endothermic and *H* positive
D. Exothermic and *H* negative

5) The ΔH for these reaction below is

$$C_3H_8 + Br_2 \rightarrow C_3H_7 + HBr$$

Bond	C-H	C-C	Br-Br	C-Br	H-Br
Bond enthalpy	+413	+347	+243	+346	+432

A. +122 Endothermic
B. +122 Exothermic
C. -122 Endothermic
D. -122 Exothermic

6) Standard of pressure is
A. 1Atm
B. 2Atm
C. 3Atm
D. 4Atm
7) Enthalpy change which doesn't found by a colorimeter can be found by help of
A. Ohms law
B. Hess,s law
C. Newton,s law
D. Kreb,s law
8) Breaking of bond is usually
A. Exothermic
B. Endothermic
C. Hypothermic
D. Ectothermic
9) When 50cm^3 of dilute nitric acid (concentration 1dm^3) is neutralized by 50cm^3 of sodium hydroxide & temp rise of 3.5K the enthalpy of neutralization is
A. -57Kj/mol
B. -29.4kj/mol
C. -109Kj/mol
D. -300Kj/mol
10) The formation of methane can be represented by the following equation

$$C + 2H_2 \rightarrow CH_4$$

Substance	C	H	CH_4
$\Delta H^{\emptyset} rkj/mol$	-197Kj/mol	-143Kj/mol	-780Kj/mol

The enthalpy change for this reaction by using the table is

A. -100Kj/mol
B. +300Kj/mol
C. -297Kj/mol
D. None

Structural questions

1)

(a)Explain what is meant by ***Exothermic*** reaction and write balanced equation for any two exothermic changes (apart from the combustion of heptanes is given on part **(b)**.

……

……

……

(b) Heptanes is C_2H_6 is a hydrocarbon found in petrol the equation for the combustion of heptanes is:-

$$C_2H_6 + 11O_2 \rightarrow 7CO_2 + 8H_2O$$

ΔH= -418 Kj/mol

Draw a simple energy level diagram to show combustion of heptanes clearly your diagram may to show in change in ΔH .

……

……

……

……

(c) Explain in terms of breaking and making bonds why this reaction is Exothermic.

……

……

……

2)

(a)Explain what is meant by ***Endothermic*** reaction and write balanced equation for any two endothermic changes (apart from the photosynthesis reaction is given on part **(b)**.

……

……

……

(b) photosynthesis involves the conversion in carbon dioxide and water into carbohydrates such as glucose $C_6H_{12}O_6$ and oxygen in presence of sunlight and chlorophyll.

$$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$$

ΔH=+2820KJ/mol

Draw an energy diagram to show the process of photosynthesis show clearly how the figure fits +2820 on to your diagram.

……

……

……

……

3) Many organisms use the aerobic respiration of glucose $C_6H_{12}O_6$, to release useful energy.

a. The overall equation for aerobic respiration is the same as for the complete for the complete combustion of $C_6H_{12}O_6$

i. Write the equation for the aerobic respiration of $C_6H_{12}O_6$?

……

……

ii.Explain in terms of, bond breaking and bond making why this reaction is exothermic?

……

……

Substance	Enthalpy change for combustion
C	-394Kj/mol
H_2	-286Kj/mol
$C_6H_{12}O_6$	-2801Kj/mol

……
……
…….

b. The table below shows some enthalpy changes of combustion

i. What is meant by the term of enthalpy change of combustion?

……

……

ii. The enthalpy change of formation of glucose $C_6H_{12}O_6$ cannot be determined directly the equation for this enthalpy change is shown below.

$6C(s) + 6H_2(g) + 3O_2(g) \rightarrow C_6H_{12}O_6(s)$

suggest why the enthalpy change of formation of glucose cannot be determined directly?

……

……

……

iii. Use the ΔH_f values in the table to calculate the enthalpy change of$C_6H_{12}O_6$?

……

……

……

……

……

……

…… Enthalpy change……Kj/mol

4) Classify each the following changes as exothermic or endothermic. In some cases you have to rely on your previous knowledge of chemistry. Several types of reactions are likely to be entirely knew to you.

a. The reaction between sodium and water.

……

b. Burning ethanol.

……

c. The reaction between sodium carbonate and ethanoic acid. A thermometer placed a mixture shows a temperature drop.

……

d. Cu$SO_4 \rightarrow CuO + SO_2$ $\Delta H = +220\ kj/mol$ and draw energy level diagram?

……

……

……

……

……

……

e. If you dissolve solid sodium hydroxide into water the solution gets too hot.

……

5) The following reaction takes place when methanol is burned:

$$2CH_3OH(l) + 3O_2(g) \rightarrow 2CO_2(g) + 4H_2O(g) \qquad \Delta H = -1452 \text{ kJ mo}l^{-1}$$

i.Does the reaction Exothermic/Endothermic? Give a reason?

……

……

ii. Draw an energy diagram to show the process of burning methanol with oxygen?

……

……

……

……

……

……

……

iii. Which one of these words best describes the energy change when methanol burns?
Put a ring around the correct answer.

Electrolytic, electronic, endothermic , exothermic

6) a. When carbon monoxide is added for hydrogen the product is methanol

$$CO(g) + 2H_2(g) \rightarrow CH_3OH(g) \qquad \Delta H = \text{-129Kj/mol}$$

i. Is the reaction is exothermic or endothermic?

……

……

ii. Give two reasons for your answer from the equation?

……

……

iii. Draw an energy level diagram for the reaction above?

……

……

……

……

……

……

b. The reaction below shows the decomposition of calcium carbonate

$CaCO_3$ (s) CaO (s) + CO_2 (g)

ΔH = +572 kj/mole

i. Is the reaction is exothermic or endothermic?

……

……

ii. Give two reasons for your answer from the equation?

……

……

iii. Draw an energy level diagram for the reaction above?

……

……

……

……

……

7) The volume of HCl is 50cm^3 and the volume of NaOH is 50cm^3 = 100cm^3 (m = 100g) and change in temperature is 6.2K the specific heat capacity is 4.2 j/g/k 50c$m^3$of HCl or NaOH of concentration is 1 mol/dm^3.

a. Find the energy transfer?

……

……

……

b. Calculate number of moles

……

……

……

……

…… N. moles……..mol

c. Calculate the molar enthalpy change of this neutralization reaction?

……

……

……$\Delta H^{\emptyset}r$ ……. J/mol or K/mol

8) a. Find the enthalpy change for a reactions below

i. $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

The bond enthalpy data is shown here

Bond	Bond enthalpy Kj/mol
N≡ N	945
H – H	436
N – H	391

……

……

……

……

…… ΔH =……Kj/mol

ii. 2HBr(g) $\rightarrow H_2 + Br_2$

Bond	Bond enthalpy Kj/mol
H-Br	366
H-H	436
Br-Br	193

……

……

……

……

……ΔH =……Kj/mol

b. What is this type of reaction is called? Give a reason?

……

……

c. What is Hess,s law and why is it useful?

……

……

9) a. State which of the following processes is endothermic and which is exothermic.
(i) The breaking of a chemical bond. ……

(ii) The forming of a chemical bond. ……

Bond	Bond energy/kJ/mol
C—H	+435

b. The table below shows the bond energy data for a series of covalent bonds.

(i) Use the information given in the table to calculate the overall enthalpy change for the combustion of ethanol producing carbon dioxide and water.

O=O	+497
C=O	+803
H—O	+464
C—C	+347
C—O	+358

………………………………………………

……………………………..……………..

………………………………………………

………………………………….. ……….

………………………………………………

……………………………..……………..

………………………………………………

…………………………………………………………………………………………….

…………………………………………………………………………….. ………..

……………………………………………………………………………. ……….

ΔH………kj/mol

ii) Is the process in **(i)** endothermic or exothermic? give two reasons?

……………………………………………………………………………..

…………………………………………………………………………….

…………………………………………………………………………….

10) The following results were obtained from a neutralization reaction between 1 mol/dm^3 hydrochloric acid and 1 mol/dm^3sodium hydroxide in a *polystyrene* beaker. This experiment was carried out to measure the heat of neutralization of hydrochloric acid. The temperature rise which occurred during the reaction was recorded.

Volume of sodium hydroxide used = 50 cm^3
Volume of acid used = 50 cm^3
Temperature rise = 5 °C
(Density of water = 1 g cm^3)

Heat energy = *mass of* × 4.2 × *temperature*
given out water/g Jg/ °C rise/°C
during
reaction

a. What does it used polystyrene beaker?

……………………………………………………………………………..

…………………………………………………………………………….

b.Write a balanced chemical equation for the reaction?

……..

……

c. How much heat energy was produced during the reaction?

……..

……

……..

…… Q=…….KJ

d. How many moles of hydrochloric acid were involved in the reaction?

……

……..

……N, of mol,,,,,,,,

e. Calculate the ΔH of neutralization? And describe its sign(+ or -)?

……

……..

……

……ΔH…….KJ/mol

11) If enthalpy is a heat for a reaction, it must have a sign as well as a magnitude. What sign should the enthalpy for an exothermic reaction have? why?

……

……..

……

12) The enthalpy of combustion of solid carbon to form carbon dioxide is -393.7Kj/mol of (C) and the enthalpy of combustion of carbon monoxide to form carbon dioxide is -283.3Kj/mol of (CO). Using these data, calculate *the change in enthalpy* for the reaction.

$$2C_{(s)} + O_{2(g)} \rightarrow 2CO_{(g)}$$

……

……..

……

……

……..

…… ΔH…….KJ/mol

Added questions

1) The following techniques are used to separate mixtures. Explain each and get an example of one mixture used to separate

A. simple distillation

……..

……..

B. fractional distillation

……..

……..

C. evaporation

……..

……..

D. chromatography

……..

……..

E. filtration

……..

……..

F. diffusion

……..

……..

2) Define these terms

a. matter

……..

……..

b. Solution

……..

……..

c. Miscible

……..

……..

d. Saturated solution

……..

……..

3) Use the kinetic theory to explain the following:

i) When you come home from school and open the door you can smell your tea being cooked.

……..

……..

ii) When two solids are placed on top of each other, they don't mix?

……..

……..

iii) Heating gas in closed container will increase its pressure?

……..

……..

iv) Smokers can cause lung damage in other people?

……..

……..

4) Explain why melting and boiling points can be used as a way to check purity?

……..

……..

5) What does a pure substance mean?

……..

……..

6) Write down two properties of

i) Solid

……..

……..

ii) Liquid

……..

……..

iii) Gas

……..

……..

7) A gas flows from one container into larger one what do you think will happen to its pressure?

……..

……..

8) Define the term of ***Valence electron*****?**

……..

……..

9) Differentiate b/n

i) an element and a compound

……..

……..

ii) a compound and a mixture

……..

……..

……..

10) What are the main sources of pollution?

……..

……..

11) We can reduce the carbon dioxide in air ***for more planting*** how can we reduce nitrogen oxides?

……..

……..

12) Name four pollutants in air? Give source of each? Describe harm they do?

……..

……..

……..

……..

13) In the ionic compound alumunium fluoride, alumunium and fluorine atoms combine in the ratio ***1:3*** what is the formula of alumunium fluoride?

……..

……..

14) What percentage of air is made up of

a. oxygen ……..

i) Give two uses of oxygen?

……..

……..

b. nitrogen ……..

15)

a. Differentiate b/n hard water and soft water including advantages and disadvantages?

……..

……..

……..

……..

b. Describe the difference b/n temporary hard water and permanent hard water?

……..

……..

……..

c. If water is either hard or soft soap lathers or scum because if soap lathers easily what does it mean?

……..

……..

d. Why water is added by a chlorine?

……..

……..

e. What does water cycle describes?

……..

……..

f. How does water cycle work?

……..

……..

g. State stages of water works?

……..

……..

16) A hydrocarbon is 84% of carbon by mass its relative molecular mass is 100. Find

a. its empirical formula

……..

……..

…….. E.f……

b. its molecular formula

……..

……..

……..

…….. M.f……

17) Explain what catalytic convertors are? And name the metals they usually use as catalysts?

……..

……..

18) Why do gases expand more than solids for the same increase in temperature?

……..

……..

19) When salt is placed on ice the ice melts. Explain why.

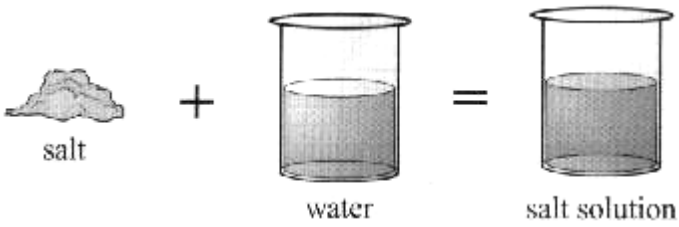
……..

……..

20) When a metal such as copper is heated it expands. Explain
……..

……..

21) When salt is added to water a solution is formed as shown in the diagram below



what are the best terms which describes the
a. salt ……..
b. water ……..
c. salt solution ……..

22) Which of the following are physical properties and which are chemical properties?
a. Gallium metal melts in your hand.
……..

……..

b. platinum doesn't react with oxygen at room temperature.
……..

……..

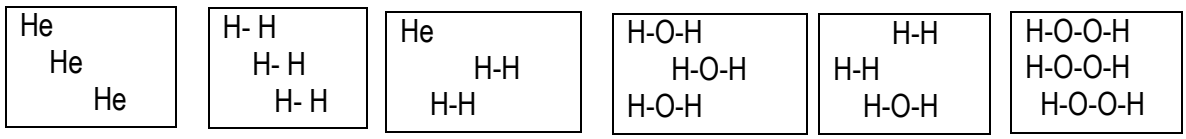
c. This page is white
……..

……..

d. Iron combines with oxygen to form rust.
……..

……..

23) Substances can be classified as elements, compounds or mixtures.
(a) Each of the boxes in the diagram represents either an element, a compound or a mixture.



box 1 box 2 box 3 box 4 box 5 box 6

i) Explain which **two** boxes represent an element.
……..

……..

……..

ii) Explain which **two** boxes represent a mixture.
……..

……..

……..

(b) The list gives the names of some methods used in the separation of mixtures:
- chromatography
- crystallization
- distillation
- filtration

Use names from the list to choose a suitable method for each separation.
Each name may be used once, more than once or not at all.
i) Separating water from sodium chloride solution.
……..

……..

ii) Separating the blue dye from a mixture of blue and red dyes.
……..

……..

iii) Separating potassium nitrate from potassium nitrate solution.
……..

……..

24) The diagram shows the elements in Period 3 of the Periodic Table.

Na	Mg	Al	Si	P	S	Cl	Ar

a)

(i) Identify an element in Period 3 that forms a basic oxide.

……..

(ii) Identify an element in Period 3 that forms an acidic oxide.

……..

b) Magnesium and chlorine react together to form magnesium chloride, a compound with ionic bonding. The equation for the reaction is

$$Mg + Cl_2 \rightarrow MgCl_2$$

(i)Draw the dot and cross diagram to show the arrangement of the outer electrons in the magnesium and chloride ions formed. Show the charge on each ion.

……..

……..

……..

……..

(ii) State what is meant by the term **ionic bonding**.

……..

……..

End