



Chemistry

**FTNA Past Paper Questions
and Answers by Topic**

Section A Questions

Matching Items

Form I

1. Introduction to Chemistry
2. Laboratory Techniques and Safety
3. Heat Sources and Flames
4. The Scientific Procedure
5. Formula, Elements, Mixtures and Compounds
6. Air, Combustion, Rusting and Fire Fighting

Form II

7. Oxygen
8. Hydrogen
9. Water
10. Fuels and Energy
11. Atomic Structure
12. Periodic Classification
13. Formula Bonding and Nomenclature

Section A Questions

Multiple Choice Questions:

2019

1. For each of the items (i) - (x), choose the correct answer from the given alternatives and write its letter in the box provided.
 - (i) What is the best way of keeping a clean test tube after use?
A Keeping it in water
B Keeping it on a test tube holder
C Keeping it in a basin for test tubes
D Keeping it on a test tube rack
 - (ii) Which one of the following **does not** involve the processes of urban water treatment and purification?
A Sedimentation. B Distillation.
C Filtration. D Chlorination.
 - (iii) Why hydrogen gas is **not** a constituent of air?
A Because of being water soluble
B Because of being denser than air
C Because of being very light
D Because of being highly flammable.
 - (iv) Which is the suitable alternative heat source to be used in absence of Bunsen burner?
A Torch and spirit burner
B Torch and kerosene stove.
C Kerosene stove and spirit burner
D Firewood and torch.
 - (v) What group and period does the element with 11 electrons belong?
A Group I and period 3.
B Group II and period 1.
C Group I and period 1.
D Group II and period 3.
 - (vi) What happens when substance A reacts with substance B to form a new substance C?
A Substance A and B are said to have formed a solution.
B Substance A and B are said to have undergone a physical change.
C Substance A and B are said to have undergone a chemical change.
D Substance A and B are said to have undergone a dissolution.
 - (vii) Which components make the fire triangle?
A Oxygen, fuel and heat.
B Oxygen, nitrogen and heat.
C Oxygen, fuel and carbon dioxide.
D Oxygen, heat and hydrogen.

- (viii) Which state is involved when drying wet clothes?
A Liquid to solid. B Solid to gas.
C Gas to liquid. D Liquid to gas.

(ix) Which net charge exists in radicals?
A Zero. B Positive or negative
C Neutral D Positive and negative

(x) Why is a non-luminous flame is the most applicable flame for heating purposes?
A It is very noisy. B It has no soot.
C It is very hot. D It has air holes open.

2018

1. For each of the items (i) – (x), choose the correct answer from among the given alternatives and write its letter in the box provided.

(i) Chemistry is the branch of Science which deals with

 - A matter in relation to energy.
 - B matter in relation to decomposition.
 - C matter composition and its decomposition.
 - D properties of conservation of matter.

(ii) Which of the following are the states of matter?

 - A Gas, liquid and mixture
 - B Gas, liquid and solid
 - C Element, compound and mixture
 - D Element, mixture and gas

(iii) Which of the following are the main components of fire triangle?

 - A Air, temperature and fire
 - B Oxygen, temperature and fuel
 - C Oxygen, heat and fuel
 - D Oxygen, temperature and fire

(iv) The process of removing solid contaminants from water is known as

 - A water decantation.
 - B water solidification.
 - C water purification.
 - D water sedimentation.

(v) How many zones are in a non-luminous flame?

 - A Four zones
 - B Two zones
 - C Three zones
 - D Five zones

(vi) The process of coating iron or steel with zinc is known as

 - A zinc painting.
 - B alloying.
 - C tin plating.
 - D galvanization.

(vii) A certain element has atomic number 'W' and mass number 'Y'. The number of neutrons contained in its nucleus is

 - A W.
 - B $W - Y$.
 - C $Y - W$.
 - D $Y + W$.

(viii) When a small amount of sugar is dissolved in a glass of water the mixture formed

is

- A heterogeneous.
C suspension.

- B immiscible.
D homogenous.

(ix) Fainting is a sudden loss of

- A confidence.
C water in the body.

- B weight of the body.
D consciousness.

(x) Why is the fractional distillation of coal done?

- A To remove oxygen in the atmosphere.
B To remove volatile matter.
C To add oxygen in the furnace.
D To add volatile matter.

2017

1. For each of the items (i) - (x), choose the correct answer from the given alternatives and write its letter in the box provided.

(i) Which statement gives clear meaning of Chemistry?

- A The study of matter in relation to energy
B The study of nature and properties of matter
C The study of matter and arrangement of particles
D The study of matter and chemical reactions

(ii) The mass number of an atom is determined by

- A protons and neutrons.
B protons and electrons.
C neutrons and electrons.
D protons alone.

(iii) Which of the following is a metal?

- A Water
B Chlorine
C Sodium
D Nitrogen

(iv) Air entering the Bunsen burner barrel can be controlled by

- A metal ring.
B air hole.
C metal jet.
D air ring.

(v) How many atoms are there in a water molecule?

- A Two
- B Three**
- C Four
- D Five

(vi) Which neutral atom has the same number of electrons as Mg^{2+} ?

- A Magnesium
- B Sodium
- C Neon
- D Argon

(vii) The appropriate extinguisher used to put off fire caused by cooking oil is

- A Water extinguisher.
- B Carbon extinguisher.
- C Wet chemical extinguisher.**
- D Dry air extinguisher.

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(viii) A non-luminous flame is obtained if the air hole is

- A fully opened.
- B partially opened.
- C closed.
- D half opened.

(ix) Which gas is the least abundant gas in the air?

- A Nitrogen.
- B Oxygen.
- C Neon.
- D Carbon dioxide.

(x) The process which produces energy in form of heat and light is called

- A decomposition.
- B combustion.
- C distillation.
- D sublimation.

2015

1. For each of the items (i) – (x), choose the correct answer from the given alternatives and write its letter in the box provided.
- (i) Which of the following is the most correct statement about hypothesis?
- A A fundamental concept or theory.
 - B A possible explanation to the problem.
 - C An important statement of a research conclusion.
 - D A stage in data interpretation.
- (ii) Which of the following is **not** among the gases composing air?
- A Noble gases
 - B Carbon dioxide
 - C Nitrogen
 - D Hydrogen.
- (iii) When an atom loses or gains electron, it becomes
- A an ion
 - B anion
 - C cation
 - D charged ion.
- (iv) A change of gaseous state to solid state without passing through a liquid state is called
- A Deposition
 - B Sublimation
 - C Condensation
 - D Solidification.
- (v) What is the type of a fire associated with electrical equipment?
- A Class E
 - B Class C
 - C Class F
 - D Class B.
- (vi) Which among the following are the two processes involved during distillation?
- A Evaporation and sublimation
 - B Evaporation and crystallization
 - C Evaporation and condensation
 - D Evaporation and decantation.
- (vii) Which of the following set of nuclide notation represents isotopes?
- A ${}_{8}^{18}X$, ${}_{9}^{16}X$, ${}_{0}^{19}X$
 - B ${}_{9}^{18}X$, ${}_{9}^{18}X$, ${}_{0}^{18}X$
 - C ${}_{8}^{16}X$, ${}_{8}^{18}X$, ${}_{9}^{18}X$
 - D ${}_{8}^{16}X$, ${}_{8}^{17}X$, ${}_{8}^{18}X$.

- (viii) The chemical used to test the presence of water in a substance is
 A Cobalt II oxide
 B Cobalt III oxide
 C Cobalt chloride
 D Copper II chloride.
- (ix) When a burning fuel produces blue colour it means there are
 A adequate supply of oxygen with production of soot
 B inadequate supply of oxygen with production of more heat
 C inadequate supply of oxygen with production of soot
 D adequate supply of oxygen with production of more heat.
- (x) Which of the following is the best apparatus for measuring accurately a fixed volume of a given solution?
 A Measuring cylinder
 B Beaker
 C Pipette
 D Burette.

Matching Items

2019

2. (a) Match the items in **List A** with a correct response in **List B** by writing the letter of the correct response below the corresponding item number in the table provided.

List A	List B
(i) A solvent which dissolves most substances to form solutions.	A Solid
(ii) A substance that has no definite shape or size.	B Solution
(iii) A substance that has a fixed shape and volume.	C Water
(iv) A substance whose components can be separated by physical means.	D Sugar
(v) Homogeneous mixture of two or more substances.	E Milk
	F Gas
	G Liquid
	H Air

Answers

List A	(i)	(ii)	(iii)	(iv)	(v)
List B				A	B

2018

2. (a) Match each item in **List A** with a correct response in **List B** by writing the letter of the correct response below the corresponding item number in the table provided.

List A	List B
(i) It occurs between two ions with opposite charges.	A Cation
(ii) It involves the sharing of electrons between atoms.	B Anion
(iii) Shows the simplest ratio of atoms or ions in a compound.	C Valency
(iv) Shows the actual number of each atom in a molecule.	D Electrovalent bond
(v) A force of attraction that holds atoms together to form molecules.	E Covalent bond
	F Empirical formula
	G Molecular formula
	H Chemical bond

Answers

List A	(i)	(ii)	(iii)	(iv)	(v)
List B					

2017

2. (a) Match each item in **List A** with a correct response in **List B** by writing its letter below the number of the corresponding item in the table provided.

List A	List B
(i) A process of separating a mixture of sodium chloride and ammonium chloride.	A Evaporation
(ii) A method used to separate oil and water.	B Filtration
(iii) A method by which coloured substances is separated and identified.	C Boiling
(iv) A method by which salt and water can be separated.	D Chromatography
(v) A method used to get the solvent from the solution mixture.	E Distillation
	F Layer separation
	G Decantation
	H Sublimation

ANSWERS

List A	(i)	(ii)	(iii)	(iv)	(v)
List B	H				E

2015

2. Match each item in **List A** with a correct response in **List B** by writing its letter below the number of the corresponding item in the table provided.

List A	List B
(i) Group of elements which reacts quickly with water to form alkaline solution.	A Metalloids
(ii) The ability of an atom to attract an electron.	B Non-metals
(iii) Group of elements in which their shells are completely filled up.	C Periodicity
(iv) A vertical column of elements in the periodic table.	D Transition elements
(v) Group of elements which reacts slowly with water to form alkaline solution.	E Electronegativity
(vi) Group of elements which reacts with metals to form salts.	F Alkali metals
(vii) Group of elements which reacts by receiving electrons.	G Halogens
(viii) The systematic arrangement of elements according to their increase in atomic numbers.	H Periodic law
(ix) Group of elements with high densities and melting points, and often act as catalysts.	I Alkali earth metals
(x) Group of elements which have both metallic and non-metallic characteristics.	J Rare non metals
	K Period
	L Noble gases
	M Periodic table
	N Group

ANSWERS

LIST A	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
LIST B	F				I					A

Fill in the Blanks

2019

- (b) Fill in the blank spaces by using the appropriate terms.
- (i) In an atom, the effect of the charged nucleons is balanced by the charge of
.....
- (ii) Serum is separated from blood samples by employing a technique called
.....
- (iii) Boiling points of substances reflect the strength of
.....
- (iv) Grinding chalk into a powder involves changing the state of
.....
- (v) The insoluble substances formed during filtration are collectively termed as
.....
- (b) Fill in the blank spaces by using the appropriate terms.
- (i) In an atom, the effect of the charged nucleons is balanced by the charge of Electron:.....
.....
- (ii) Serum is separated from blood samples by employing a technique called chromatography:.....
.....
- (iii) Boiling points of substances reflect the strength of Intermolecular force:.....
.....
- (iv) Grinding chalk into a powder involves changing the state of Solid:.....
.....
- (v) The insoluble substances formed during filtration are collectively termed as residue:.....
.....

2018

- (b) Fill in the blank spaces with the correct answer.
- (i) A reaction that releases energy in the form of light and heat is called _____.
 - (ii) A chemical process that occurs in steel and iron in the presence of air and water is known as _____.
 - (iii) Oxygen, heat and fuel are the three components that make _____.
 - (iv) Injuries resulted from the body coming into contact with heat or harmful chemicals are called _____.
 - (v) A solution which can dissolve no more solute at a given temperature is called _____.

2017

- (b) Fill in the blanks with the correct answer.
- (i) A flame is a zone of burning gas that produces _____ and _____.
 - (ii) The arrangement of electrons in different shells in the atom is called _____.
 - (iii) A type of gas fuel derived from decomposing biological waste is called _____.
 - (iv) The three components of the fire triangle are heat, fuel and _____.
 - (v) A substance that speeds up a chemical reaction but remains chemically unchanged is called _____.

Answers:

- i.
- ii. Electronic Configuration**
- iii.
- iv.
- v.

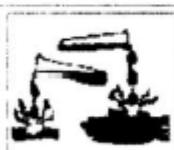
1. Introduction to Chemistry

2. Laboratory Techniques and Safety

2019

7. What precautions will you take in handling chemicals having the warning signs shown in the table?

S/N	Sign	Relevant Precaution
(a)		(i) (ii)
(b)		(i) (ii)
(c)		(i) (ii)
(d)		(i) (ii)
(e)		(i)

S/N	Sign	Relevant Precaution
(a)		<p>(i) Handle...with...care...and...do...not...heat...such...substance...on...fire...directly.</p> <p>(ii) Avoid...exposing...it...to...any...heat...apart...from...the...limited...heat...degree...of...storage...and...usage...because...it...can...explode.</p>
(b)		<p>(i) Avoid...exposing...such...substance...to...fire...because...it...is...highly...flammable.</p> <p>(ii) Avoid...storing...such...substances...in...places...where...you...are...heating...other...substances.</p>
(c)		<p>(i) Avoiding...drinking...or...tasting...such...substance...because...they...are...poisonous.</p> <p>(ii) Avoid...such...substances...storing...it...or...placing...it...open...because...it...can...fall...on...any...other...chemical...and...cause...trouble.</p>
(d)		<p>(i) Handle...with...care...by...making...sure...that...I...don't...spill...into...any...contact...with...it...because...it...is...corrosive.</p> <p>(ii) Preventing...such...substances...from...coming...into...contact...with...things...like...a...wooden...material...or...which...can...be...corroded.</p>
(e)		<p>(i) Precaution...taken...is...exposing...such...substance...to...a...burning...material...or...to...fire...because...it...support...burning.</p> <p>(ii) Store...such...substances...with...care...and...do...not...heat...such...substance...of...fire...directly.</p>

2019

3. (a) State one use of each of the items (i) - (v) in administering First Aid.

S/N	Item	Use
(i)	Soap	
(ii)	Bandage	
(iii)	Sterile gauze	
(iv)	Iodine tincture	
(v)	Petroleum jelly	

- (b) Give one function of each of the following apparatuses in the chemistry laboratory.

- (i) Spatula
.....
- (ii) Gas jar
.....
- (iii) Lie-big condenser
.....
- (iv) Mortar and pestle
.....
- (v) Wire gauze

3. (a) State one use of each of the items (i) - (v) in administering First Aid.

S/N	Item	Use
(i)	Soap	It is used for washing hands, wounds as well as equipments.
(ii)	Bandage	It is used for covering wounds so as to protect it from microorganism and dust conditions
(iii)	Sterile gauze	It is used for washing and drying wounds
(iv)	Iodine tincture	It is usually applied on fresh cuts and wounds.
(v)	Petroleum jelly	It is used for smoothening or soothing chapped skin and wounds.

- (b) Give one function of each of the following apparatuses in the chemistry laboratory.

- (i) Spatula ... It is an apparatus used for scooping powdered chemicals and substances in the laboratory.
- (ii) Gas jar ... It is an apparatus for collecting gases in the laboratory. It is normally assisted with delivery tubes and beaking shelf for collecting different gases.
- (iii) Lie-big condenser ... It is an apparatus used for cooling water vapour. It is normally applied in distillations such as ff. simple and fractional distillation.
- (iv) Motor and pestle ... It is an apparatus used for crushing and grinding substance into powder form, which are then scooped by spatula.
- (v) Wire gauze ... It is used for spreading flame, preventing direct heat to reach apparatus as well as preventing soot during heating.

2018

4. (a) Draw and give one function of the following apparatus:

Apparatus	Drawing	Function
(i) Measuring cylinder		
(ii) Conical flask		

4. (a) Draw and give one function of the following apparatus:

Apparatus	Drawing	Function
(i) Measuring cylinder		It is used to measure the volume of liquids
(ii) Conical flask		It is used to hold and mix liquid chemicals in the laboratory.

2018

ANSWER ALL QUESTIONS

3. (a) Indicate the corresponding meaning of the following warning signs:

	Symbol	Meaning
(i)		
(ii)		
(iii)		
(iv)		

- (b) Give four importance of the First Aid.

3. (a) Indicate the corresponding meaning of the following warning signs:

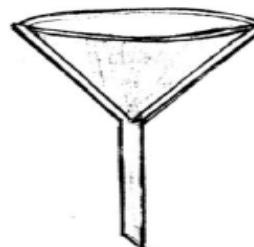
	Symbol	Meaning
(i)		<u>Flammable</u> Catches fire Easily.
(ii)		<u>Toxic</u> this substance is dangerous and can cause death.
(iii)		<u>OXIDANT</u> ^{can} this substance ^{can} Speed up the rate of burning.
(iv)		<u>IRRITANT</u> this substance can Irritate parts of the body.

2017

3. (a) Draw and state one function of each of the following apparatuses:

Apparatus	Drawing	Function
(i) Burette		
(ii) Filter funnel		
(iii) Beaker		
(b) Define the following terms:		
(i) First aid	
(ii) Laboratory	
(c) List two components of a first aid kit.		
(i)	
(ii)	

3. (a) Draw and state one function of each of the following apparatuses:

Apparatus	Drawing	Function
(i) Burette		<p>It is used for measuring accurate volume of liquids. It is oftenly used in titration experiments.</p>
(ii) Filter funnel		<p>It is used for separating mixture of sand and water.</p>

(iii) Beaker		<p>It is used for holding and heating liquids during experiments.</p>
(b)	Define the following terms: (i) First aidis....an....immediate....care....of....or....help..... given....to....a....victim....before....taking....him/her....to....the (ii) Laboratoryis....a....special....room....or....building....designedfor....carrying....out....scientific....experiments....	

(c) List two components of a first aid kit.
 (i) Adhesive bandage (plaster)
 (ii) Soap.....

2015

3. (a) Define the following terms:
 (i) Oxidation state.....
3. (a) Define the following terms:
 (i) Oxidation state.....Is the measure of electron control that an atom has in a compound compared to the pure element

2015

- (b) What is the use of each of the following apparatus?
 (i) Thistle funnel
- (ii) Pipette
- (iii) Wire gauze
- (iv) Burette.....
- (b) What is the use of each of the following apparatus?
 (i) Thistle funnel Used when dropping or adding liquids in an experiment.....
 (ii) Pipette Used to measure specific volume of liquids.....
 (iii) Wire gauze Used for trapping root when heating a substance.....
 (iv) Burette Used for measuring and dispensing liquids.....

3. Heat Sources and Flames

2018

- (b) By excluding a Bunsen burner, mention other three sources of heat that can be used in the laboratory.

(i)

(ii)

(iii).....

- (b) By excluding a Bunsen burner, mention other three sources of heat that can be used in the laboratory.

(i) Spirit burner.....

(ii) Gas stove.....

(iii) Kerosene burner.....

4. The Scientific Procedure

2019

6. (a) Differentiate hypothesis from analysis.
- (b) Effective use of the four senses of observation is important before a chemist can make a conclusion. With four points, show how the senses are used as tools of observation during experimentation by giving one example for each.
6. (a) Differentiate hypothesis from analysis.
- Hypothesis is an intelligent scientific guess which tries to answer or solve the problem. BUT Data analysis is the process of arranging the data collected in a certain format such as table format or graph format.
-
-
- (b) Effective use of the four senses of observation is important before a chemist can make a conclusion. With four points, show how the senses are used as tools of observation during experimentation by giving one example for each.
- (i) Sight: This is a sense that helps us see. It helps to observe how an experiment occurs. For example: While measuring volume we use our eyes to know the volume of a substance in the measuring cylinder.
- (ii) Hearing: This sense helps to know what sound is produced when a certain experiment occurs. Eg: Hearing helps to test hydrogen because it burns with a pop sound.
- (iii) Smell: This sense helps to know how something smells in an experiment. For example: Water is odourless so you can easily identify it in an experiment.
- (iv) Touch: This sense helps to know how the substance is in an experiment. For example: When you touch concentrated sulphuric acid with your bare hand you may easily identify it as you may feel it corroding your hand.

5. Formula, Elements, Mixtures and Compounds

2018

5. (a) Define the following terms:

(i) Brownian motion

.....
.....
.....
.....
.....

(ii) Compound

.....
.....
.....

- (b) Identify whether the following is a physical or chemical change:

(i) Cutting aluminium foil into pieces.....

(ii) Lighting a match.....

- (c) How can you separate the following mixtures? Briefly explain.

(i) Water and kerosene

(ii) Salt and water

(iii) Ethanol and water

5. (a) Define the following terms:

(i) Brownian motion

.....the.....tiny.....particles.....
.....of.....matter.....suspended.....in.....a.....fluid.....

(ii) Compound

.....the.....substance.....formed.....when.....two.....or.....
.....more.....elements.....are.....chemically.....combined.....

- (b) Identify whether the following is a physical or chemical change:

(i) Cutting aluminium foil into pieces.....Physical.....change.....

(ii) Lighting a match.Chemical.....change.....

- (c) How can you separate the following mixtures? Briefly explain.

(i) Water and kerosene

.....They....can....be....separated....by....Holding....a....
.....Separating....funnel....where....water....will....start....to....be....
.....Separated....leaving....the....kerosene....inside....the....funnel....because....
.....water....is....more....dense....than....kerosene....

2017

4. (a) Define matter.

- (b) Tell whether the following is a chemical change or physical change.

- (i) Rotting of mango.....
(ii) Clouds changing into rain.....
(iii) Decaying of teeth.....

- (c) State four differences between a chemical change and physical change.

S/n	Chemical change	Physical change
-----	-----------------	-----------------

4. (a) Define matter. Is anything which has mass and occupies a certain space.

- (b) Tell whether the following is a chemical change or physical change:

- (i) Rotting of mango..... chemical change.....
(ii) Clouds changing into rain..... Physical change.....
(iii) Decaying of teeth..... chemical change.....

- (c) State four differences between a chemical change and physical change.

S/n	Chemical change	Physical change
(i)	It is irreversible, which means it can not change back to its original state.	It is reversible, meaning that it can recover its original state.
(ii)	There is energy liberated or absorbed during the change.	There is no energy liberated or absorbed during the change.
(iii)	It affects the chemical composition of substance since new substance is formed.	It doesn't affect the chemical composition of a substance.
(iv)	There is a new substance formed.	No new substance is formed.

2015

- (ii) An element.....
- (iii) A compound.....
- (ii) An element..... Is a pure chemical substance which cannot be split in a simpler substance by simple chemical process.
- (iii) A compound..... Is the chemical substance that is made up of two or more substance in chemical combination.
- (iv) Fainting.....
- (iv) Fainting..... Is the failure of breathing due to low of oxygen in the brain.
- (b) Write the chemical formula for each of the following compounds.
- (i) Sodium sulphate.....
- (ii) Sodium chloride.....
- (iii) Calcium nitrate.....
- (iv) Calcium oxide.....
- (b) Write the chemical formula for each of the following compounds:
- (i) Sodium sulphate..... Na_2SO_4
- (ii) Sodium chloride..... NaCl
- (iii) Calcium nitrate..... $\text{Ca}(\text{NO}_3)_2$
- (iv) Calcium oxide..... CaO

6. Air, Combustion, Rusting and Fire Fighting

2019

8. Briefly explain the five classes of fires based on the nature of the burning material and the extinguisher required. Give one example for each class.

(a) Class A fire

Materials that burn are ordinary solids.

Extinguisher required is dry powder extinguisher.

(b) Class B fire

Materials that burn are flammable liquids.

Fire extinguisher required is dry powder extinguisher.

(c) Class C fire

Material that burns is flammable gas.

Fire extinguisher required is foam extinguisher.

(d) Class D fire

Material that burns is combustible metals.

Fire extinguisher required is dry powder extinguisher.

(e) Class E fire

Material that burns is electrical equipment.

Fire extinguisher required is carbon dioxide extinguisher.

2017

7. (a) (i) Why a flame produced by a "spirit lamp" may not be good for heating in the laboratory? Give two reasons.

(ii) Name the type of flame produced by a spirit lamp.

.....

(b) By using locally available materials in your school, state how the fire can be extinguished in the following situations:

(i) Kerosene spilled on the floor catches fire.

.....

(ii) Friend's clothes catch fire which gets out of her control.

.....

(c) Suggest the suitable method of preventing rust in the following:

(i) Moving parts of machines e.g. motorcycle chain.

.....

(ii) Motor vehicle (car) bodies.

7. (a) (i) Why a flame produced by a "spirit lamp" may not be good for heating in the laboratory? Give two reasons.

(i) Because it produces less amount of heat which is not enough to be used to heat different substances during the experiment.
(ii) Also, because it produces dust.

- (ii) Name the type of flame produced by a spirit lamp.

Luminous flame

- (b) By using locally available materials in your school, state how the fire can be extinguished in the following situations:

- (i) Kerosene spilled on the floor catches fire.

Here, I can use sand and saw branches of trees.

- (ii) Friend's clothes catch fire which gets out of her control.

Also, here I can use the fire blanket and water since the materials which are burning are organic, that is all.

- (c) Suggest the suitable method of preventing rust in the following:

- (i) Moving parts of machines e.g. motorcycle chain.

These parts of machine can be prevented from rusting by using the lubricant and other substance such as oil. Therefore, the way is Oiling.

- (ii) Motor vehicle (car) bodies.

The motor vehicle bodies are prevented from rusting through the method of painting them.

7. Oxygen

2019

4. (a) By giving one reason, explain the following facts:
- During laboratory preparation of oxygen gas, little manganese dioxide is added to hydrogen peroxide.
.....
.....
 - Fish can obtain oxygen for respiration although they spend their lives in water.
.....
.....
 - Oxygen gas can be used for welding activities although it does not burn.
.....
.....
4. (a) By giving one reason, explain the following facts:
- During laboratory preparation of oxygen gas, little manganese dioxide is added to hydrogen peroxide.
Little manganese oxide is added in preparation of oxygen so as to act as a catalyst for speeding up the rate of chemical reaction so as to produce oxygen.
 - Fish can obtain oxygen for respiration although they spend their lives in water.
Fish have organs specialized for respiring oxygen and because oxygen is slightly soluble in water the fish are able to use their gills to breath that oxygen contained in water.
 - Oxygen gas can be used for welding activities although it does not burn.
Oxygen gas easily combines with hydrogen or other gases at high temperatures to form flames that are hot and can be used in welding.

2018

9. (a) Outline six common apparatus used in the laboratory preparation of oxygen gas using hydrogen peroxide.

- (b) Outline four uses of oxygen in everyday life situations.

9. (a) Outline six common apparatus used in the laboratory preparation of oxygen gas using hydrogen peroxide.

- (i) A gas jar
(ii) Flat bottomed flask
(iii) Thistle funnel
(iv) Delivering tube
(v) trough
(vi) Beehive shelf.

- (b) Outline four uses of oxygen in everyday life situations.

- (i) Used by plants for germination process.
(ii) Used by mountain climbers.
(iii) Used by pre-mature babies in incubators.
(iv) Used by divers.

2017

5. (a) Write the names and formulae of the two chemicals that can be used in the preparation of oxygen gas.

- (i)
(ii)

- (b) (i) State an appropriate method of collecting oxygen gas based on solubility and density of the gas in water.

- (ii) How can oxygen gas be tested?
.....
.....

- (c) List four uses of oxygen gas.

- (i)
(ii)

5. (a) Write the names and formulae of the two chemicals that can be used in the preparation of oxygen gas.

(i) Hydrogen peroxide H_2O_2

(ii) Potassium chlorate $KClO_3$

- (b) (i) State an appropriate method of collecting oxygen gas based on solubility and density of the gas in water.

It is collected by downward displacement of water

- (ii) How can oxygen gas be tested?

Burning it with glowing splint
of wood

- (c) List four uses of oxygen gas.

(i) Used by divers in large water bodies

(ii) Used to burn fuel in rocket

(iii) Used for welding process

(iv) Used for respiration purpose

2015

4. Gas X can be prepared in the laboratory by the decomposition of hydrogen peroxide.

- (a) Identify gas X.

.....

- (b) State three physical properties of Gas 'X'.

- (c) Mention three chemical properties of gas 'X'.

- (d) State three uses of gas 'X'.

4. Gas X can be prepared in the laboratory by the decomposition of hydrogen peroxide.

- (a) Identify gas X.

Oxygen

- (b) State three physical properties of Gas 'X'.

(i) It is neutral to litmus paper.

(ii) It is colourless, odourless and tasteless.

(iii) It is slightly soluble in water.

- (c) Mention three chemical properties of gas 'X'.

(i) It supports combustion.

(ii) It reacts with metals to form metallic oxides.

(iii) It reacts with non-metals to form non-metallic oxides.

- (d) State three uses of gas 'X'.

(i) Used for respiration.

(ii) Used in welding.

(iii) Helps in burning of materials.

8. Hydrogen

2019

- (b) Which property enables the use of hydrogen gas in
(i) filling weather balloons?

.....
.....

- (ii) production of oxy-hydrogen flame?

.....
.....

- (c) Give two domestic uses of oxygen gas.

.....

- (b) Which property enables the use of hydrogen gas in

- (i) filling weather balloons?

Hydrogen is less denser than air so when it is filled in balloons it makes them to float in air.

- (ii) production of oxy-hydrogen flame?

Hydrogen gas is flammable thus combines with oxygen at high temperatures up to 3000°C so as to form oxy-hydrogen flame used in welding.

- (c) Give two domestic uses of oxygen gas.

- Oxygen is used for respiration by living organisms, without oxygen living organisms will not survive.

- Oxygen gas is used for cooking or heating, this is because oxygen supports combustion.

2018

6. (a) During preparation of Hydrogen gas by the reaction between dilute Hydrochloric acid and Zinc granules, the granules slowly dissolve in acid to form solution X.
- (i) Name solution X.....
- (ii) Write chemical formula of X.....
- (b) How can hydrogen gas be tested?
.....
.....
- (c) Mention four (4) chemical properties of hydrogen gas.
- (i)
- (ii)
- (iii)
- (iv)
- (d) List three (3) uses of Hydrogen gas.
- (i)
- (ii)
- (iii)

6. (a) During preparation of Hydrogen gas by the reaction between dilute Hydrochloric acid and Zinc granules, the granules slowly dissolve in acid to form solution X.
- (i) Name solution X Zinc chloride.....
- (ii) Write chemical formula of X ZnCl₂.....
- (b) How can hydrogen gas be tested?
When a burning splint is brought near a gas jar containing hydrogen gas, the gas explodes with a 'pop' sound.
- (c) Mention four (4) chemical properties of hydrogen gas.
- (i) It does not support combustion.....
- (ii) It is highly flammable.....
- (iii) A mixture of hydrogen and air explodes when lit.....
- (iv) It is a reducing agent.....
- (d) List three (3) uses of Hydrogen gas.
- (i) Is used in manufacture of margarine.....
- (ii) Is used in manufacturing of hydrochloric acid.....
- (iii) Is used in filling weather balloons.....

2017

9. Hydrogen gas is prepared in the laboratory by reacting dilute hydrochloric acid and zinc granules.

(a) Write an alternative acid that can be used to prepare hydrogen instead of dilute hydrochloric acid.

(b) Give two physical and two chemical properties of hydrogen.

S/n	Physical properties	Chemical properties
(i)		
(ii)		

(c) What will happen if a burning wooden splint is lowered in a test tube containing hydrogen gas?

(d) Give two uses of hydrogen gas in daily life.

(i)

9. Hydrogen gas is prepared in the laboratory by reacting dilute hydrochloric acid and zinc granules.

(a) Write an alternative acid that can be used to prepare hydrogen instead of dilute hydrochloric acid.

Dilute Sulphuric Acid (H_2SO_4)

(b) Give two physical and two chemical properties of hydrogen.

S/n	Physical properties	Chemical properties
(i)	It is colourless, tasteless and odourless	It reacts slowly with oxygen to form water
(ii)	It is less denser than air	It burns but not support combustion

(c) What will happen if a burning wooden splint is lowered in a test tube containing hydrogen gas?

.....It will burn with a pop sound when lowered in a test tube containing hydrogen gas....

2015

9. When dilute hydrochloric acid is reacted with zinc metal, gas Z is formed.

(a) Identify the name of gas Z.

(b) Mention four physical properties of gas Z.

(c) State two uses of gas Z.

9. When dilute hydrochloric acid is reacted with zinc metal, gas Z is formed.

(a) Identify the name of gas Z.

Oxygen

(b) Mention four physical properties of gas Z.

(i) Used in welding

(ii) Used in Respiration

(iii) Used in Flying balloon

(iv) Make the It is friendly to the fuel

(c) State two uses of gas Z.

(i) Used by a human being in the body

(ii) Used in man ballooning the wind vane

9. Water

2019

5. (a) Give three chemical tests for water and show the results obtained in each.
- (i) _____
- (b) (i) Differentiate water treatment from water purification.
- (ii) Why drinking water should be treated and purified? Give two reasons.
- (iii) How can drinking water be treated or purified?
- 5 (a) Give three chemical tests for water and show the results obtained in each.
- (i) Water turns a white anhydrous copper (II) Sulphate ($CuSO_4$) into blue.
- (ii) Water turns blue cobalt chloride paper into pink.
- (iii) Water is neutral on litmus paper because it is neither acidic or basic so when tested on litmus, the litmus turns neither blue nor red.
- (b) (i) Differentiate water treatment from water purification.
Water treatment refers to the process in which dust and microorganisms are removed from water so as to make it safe for use. It can be domestic treatment of water or urban treatment of water while water purification is the process in which dust and microorganisms are removed from treated water so as to make it pure and safe for drinking and water treatment makes water pure for domestic, industrial or medical purposes.
- (ii) Why drinking water should be treated and purified? Give two reasons.
- Drinking water should be treated and purified because it helps to remove microorganisms that could have caused diseases if were taken without.
 - Treating and purifying water makes it suitable for domestic uses example in cooking it is safe for use or in washing and cleaning purposes.
- (iii) How can drinking water be treated or purified?
- By boiling, water is boiled for sometime to kill germs
 - By filtration, putting a cloth on top of container and filtering
 - By using purifiers, example aqua guard.....

2015

5. (a) Write the name of each of the following compounds:
- (i) $(\text{NH}_4)_2\text{CO}_3$
(ii) CaCl_2
(iii) Na_2SO_4
(iv) KClO_3

5. (a) Write the name of each of the following compounds:
- (i) $(\text{NH}_4)_2\text{CO}_3$Ammonia Carbonate
(ii) CaCl_2Calcium chloride
(iii) Na_2SO_4Sodium sulphate
(iv) KClO_3Potassium Chlorate (v)

2015

6. (a) State two chemical properties of water.

6. (a) State two chemical properties of water.
- (i) It changes anhydrous copper (II) sulphate from white to blue.
(ii) It changes anhydrous cobalt (II) chloride from blue to pink.

10. Fuels and Energy

2019

10. Briefly explain five characteristics to be considered when looking for a good fuel.

(i)

It must be easily affordable to many people. A good fuel like wood if it is not expensive to afford and many people can acquire it and get it.

(ii)

If must not give off any poisonous gases. A good fuel is not harmful or should not endanger the lives of people by producing harmful gases instead it should be harmless to the ones using it.

(iii)

If must be easily stored and transported. A good fuel should not be heavy that it can not be moved from one place to another and it should be easy to store it.

(iv)

If must be cheap. A good fuel must not be expensive that many people can not buy it instead it should have an affordable price and not cost much.

(v)

If must be easy to control. A good fuel is easy to control when you want to put it off it can be easy to put it off and it does not require alot of energy to burn it.

2018

8. (a) Write four sources of energy used for cooking in most Tanzanian societies.

- (i)
- (ii)
- (iii)
- (iv)

(b) List four characteristics of a good fuel.

- (i)
- (ii)
- (iii)
- (iv)

(c) List two areas where scientific procedure can be applied.

- (i)
- (ii)

8. (a) Write four sources of energy used for cooking in most Tanzanian societies

- (i) Firewood
- (ii) Charcoal
- (iii) Natural gas
- (iv) Kerosene

(b) List four characteristics of a good fuel.

- (i) Should not produce harmful byproducts/gases.
- (ii) Should have little or no waste products like ashes.
- (iii) Should produce high heat content.
- (iv) Should be easily stored and transported.

(c) List two areas where scientific procedure can be applied.

- (i) At schools
- (ii) In hospitals

11. Atomic Structure

2018

7. (a) (i) How many electrons and protons are present in oxygen element and aluminum element?

.....
.....
.....
.....

- (ii) Write the electronic configuration of chlorine ion.

.....
.....
.....
.....

- (b) Use the elements with chemical symbols: P, S and Cl to answer the following questions:

- (i) Which element is the most electronegative?

.....
.....

- (ii) Mention the least electronegative element.

.....
.....

- (iii) Which element has the largest atomic structure?

.....
.....

- (a) (i) How many electrons and protons are present in oxygen element and aluminum element?

...Oxygen element... 8 protons...and... 8 electrons.....

...Aluminum element... 13 protons...and... 13 electrons.....

- (ii) Write the electronic configuration of chlorine ion.

...Chlorine ion ... 2,8,8

.....
.....

- (b) Use the elements with chemical symbols: P, S and Cl to answer the following questions:

- (i) Which element is the most electronegative?

...Chlorine.....

- (ii) Mention the least electronegative element.

...Phosphorus.....

- (iii) Which element has the largest atomic structure?

...Phosphorus.....

2015

7. (a) Study the following Periodic Table and then answer the questions that follow.

I	II	III	IV	V	VI	VII	VIII
A	C		D		E		B
F	G					H	

- (i) Write the collective name of elements in:

Group II

Group VIII

- (ii) Name the elements which are represented by the following letters:

A B

C D

- (iii) Write the electronic configuration of the following elements:

E F

G H

7. (a) Study the following Periodic Table and then answer the questions that follow.

I	II	III	IV	V	VI	VII	VIII
A	C		D		E		B
F	G					H	

- (i) Write the collective name of elements in:

Group II Alkaline earth metals

Group VIII Noble gases

- (ii) Name the elements which are represented by the following letters:

A Hydrogen B Helium

C Beryllium D Carbon

- (iii) Write the electronic configuration of the following elements:

E $1s^2 2s^2 2p^6$ F $1s^2 2s^2 2p^6 3s^1$

G $1s^2 2s^2 2p^6 3s^2 3p^2$ H $1s^2 2s^2 2p^6 3s^2 3p^5$

12. Periodic Classification

2018

- (c) Study the following table with element lettered F, G, L, M and J, then answer the questions that follow.

Element	Atomic mass	Atomic number
F	16	8
G	19	9
L	23	11
M	12	6
J	20	10

- (i) How many neutrons are present in element L?

.....

- (ii) Which group and period of the periodic table does element F belong?

.....

- (iii) Which element does not readily form compounds? Give a reason.

2017

8. The following is a part of periodic table with some elements represented by letters. Study it and answer the questions that follow.

I	II	III	IV	V	VI	VII	VIII
A							B
C							D
E					F	G	
	H						

- (a) (i) Mention the names of the elements represented by letters:

A

B

C

D

E

F

G
H

- (ii) Write the electronic configuration of the elements represented by letter G and H.

.....
.....

- (b) Identify the letter which represents the elements with the following properties:

- (i) Zero valency.....
(ii) Lightest atom.....
(iii) Alkaline earth metal.....

- (a) (i) Mention the names of the elements represented by letters:

A Hydrogen.....
B Helium.....
C Lithium.....
D Neon.....
E Sodium.....
F Sulphur.....

G Chlorine.....
H Calcium.....

- (ii) Write the electronic configuration of the elements represented by letter G and H.

G = 2:8:7.....

H = 2:8:8:2.....

- (b) Identify the letter which represents the elements with the following properties:

- (i) Zero valency... B and D,
(ii) Lightest atom... A,
(iii) Alkaline earth metal... H

2015

- (b) Name two products in each of the following fields made by the application of chemistry.

Field	Products
(a) Medicine	
(b) Food and beverage industry	

- (b) Name two products in each of the following fields made by the application of chemistry.

Field	Products
(a) Medicine	Panadol and Chloroquin ..
(b) Food and beverage industry	Baking powder and drinks such as soda

13. Formula Bonding and Nomenclature

2019

9. A certain gaseous compound contains 30.4% of nitrogen and 69.6% of oxygen by mass. If the molar mass of the compound is 92, calculate the molecular formula.

Stage	Nitrogen	Oxygen

Stage	Nitrogen	Oxygen
Element	N	O
Percentage	30.4	69.6
Relative Atomic mass (R.A.M)	14	16
Percentage R.A.M	$\frac{30.4}{14} = 2.17$	$\frac{69.6}{16} = 4.35$
Divide by the smallest to both.	$\frac{2.17}{2.17} = 1$	$\frac{4.35}{2.17} = 2.0$
Ratio	1	2

Empirical formula is NO_2

Molecular formula = $n(\text{Empirical formula})$

Molar mass = $n(\text{NO}_2)$

$$92 = n(N + 2 \times O)$$

$$= n(14 + 2 \times 16)$$

$$= n(14 + 32)$$

$$92 = 46n$$

$$\frac{92}{46} = \frac{46n}{46}$$

$$n = 2$$

Molecular formula = $2(\text{NO}_2)$

$$= \text{N}_2\text{O}_4$$

∴ The molecular formula is N_2O_4

2018

10. (a) Define the following terms:

(i) Valency

(ii) Oxidation state

(iii) Anion

(iv) Cation

- (b) Calculate the oxidation state of the underlined elements in the following radicals:

(i) $\underline{\text{N}}\text{H}_4^+$

(ii) $\underline{\text{S}}\text{O}_4^{2-}$

(iii) $\underline{\text{C}}\text{lO}_3^-$

- (c) A compound consists of 40% carbon, 6.67% hydrogen and 53.33% oxygen. If its relative molecular mass is 60, calculate the following:

(i) Empirical formula

(ii) Molecular formula

10. (a) Define the following terms:

(i) Valency

.....Valency.....is.....the.....number.....of.....electrons.....that.....an.....atom.....can.....share,...receive....or....donate....during....a....chemical....bonding.....

(ii) Oxidation state

.....Is.....a.....measure.....of.....electron.....control.....that.....an.....atom.....has.....in.....a.....compound.....compared.....to.....the.....atom.....in.....pure.....element.....

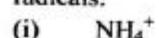
(iii) Anion

.....Is.....a.....negatively.....charged.....ion.....formed.....when.....non-metals.....gain.....electrons.....during.....a.....chemical.....bonding.....so.....as.....to.....gain.....a.....stable.....structure.....

(iv) Cation

.....Is.....a.....positively.....charged.....ion.....formed.....when.....a.....metal.....loses.....electrons.....during.....a.....chemical.....bonding.....so.....as.....to.....remain.....stable.....

- (b) Calculate the oxidation state of the underlined elements in the following radicals:



$$\text{N} + (1 \times 4) = 1$$

$$\text{N} + 4 = 1$$

$$\text{N} = 1 - 4$$

$$\text{N} = -3$$

\therefore Oxidation state of N = -3



Solution

$$\text{S} + (-2 \times 4) = -2$$

$$\text{S} - 8 = -2$$

$$\text{S} = -2 + 8$$

$$\text{S} = +6$$

\therefore Oxidation state of S = +6



Solution

$$\text{Cl} + (-2 \times 3) = -1$$

$$\text{Cl} - 6 = -1$$

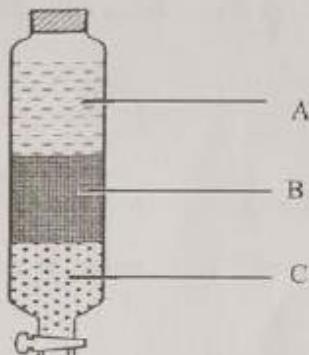
$$\text{Cl} = -1 + 6$$

$$\text{Cl} = +5$$

\therefore Oxidation state of Cl = +5

2017

10. (a) The following Figure shows the apparatus that can be used to separate three liquids: cooking oil, kerosene and water with density 0.92 g/cm^3 , 0.65 g/cm^3 and 1.00 g/cm^3 respectively.



- (i) Name the apparatus shown by the given figure.

- (ii) By giving a reason, identify liquids A and C.

Liquid A

Liquid C

Reason

- (b) The following table shows the name and the chemical formula of the product formed when ions combine together. Complete filling the table.

Table showing combination of ions

Ions		Name	Formula
Ca^{2+}	Cl^-	Calcium chloride	
Al^{3+}	SO_4^{2-}		$\text{Al}_2(\text{SO}_4)_3$
H^+		Hydrogen sulphate	

- (i) Name the apparatus shown by the given figure.

.....Separating funnel.....

- (ii) By giving a reason, identify liquids A and C.

Liquid AKerosene.....

Liquid CWater.....

Reason ...Liquid A is Kerosene because it has low density.....
.....than that of cooking oil and water. Kerosene has the.....
.....density of 0.65 g/cm^3 , while cooking oil has 0.93 g/cm^3
.....and water 1 g/cm^3 greater than that of kerosene.....

.....Liquid C is water because it has greater density than.....
.....that of cooking oil and kerosene. Water has 1 g/cm^3 while.....
.....Kerosene 0.65 g/cm^3 and cooking oil has 0.93 g/cm^3 less.....
.....denser than that of water.....

- (b) The following table shows the name and the chemical formula of the product formed when ions combine together. Complete filling the table.

Table showing combination of ions

Ions		Name	Formula
Ca^{2+}	Cl^-	Calcium chloride	CaCl_2
Al^{3+}	SO_4^{2-}	Aluminium sulphate	$\text{Al}_2(\text{SO}_4)_3$
H^+	SO_4^{2-}	Hydrogen sulphate	H_2SO_4

2017

6. (a) Write the names of the following radicals:
- (i) SO_3^{2-}
- (ii) ClO_3^-
- (iii) PO_4^{3-}
- (b) Calculate the oxidation state of the underlined element in the following compounds:
- (i) NH_4Cl
- (ii) Al_2O_3
- (iii) $\text{Na}_2\text{S}\text{O}_4$
- (iv) H_2O_2
- (c) Calculate the percentage composition by mass of the underlined element in the following compounds:
- (i) $\text{H}_2\text{S}\text{O}_4$
- (ii) $\text{Ca}(\text{N}\text{O}_3)_2$

6.	(a)	Write the names of the following radicals:
	(i)	SO_3^{2-} ... sulphite
	(ii)	ClO_3 ... chlorate (v) oxide
	(iii)	PO_4^{3-} ... Phosphate
	(b)	Calculate the oxidation state of the underlined element in the following compounds:
	(i)	NH_4Cl $\text{N} \underline{\text{H}}_4\text{Cl} = 0$ $(-3) + (+1 \times 4) + \text{Cl} = 0$ $-3 + 4 + \text{Cl} = 0$ $\text{Cl} = 3 - 4$ $\text{Cl} = -1$ $\therefore \text{Cl} = -1$
	(ii)	Al_2O_3 $\text{Al}_2\underline{\text{O}}_3 = 0$ $(+3 \times 2) + 3\underline{\text{O}} = 0$ $6 + 3\underline{\text{O}} = 0$ $\underline{\text{O}} = -6$ $\underline{\text{O}} = -2$ $\therefore \text{O} = -2$
	(iii)	Na_2SO_4 $\text{Na}_2\underline{\text{S}}\text{O}_4 = 0$ $(+1 \times 2) + \underline{\text{S}} + (-2 \times 4) = 0$ $2 + \underline{\text{S}} - 8 = 0$ $\underline{\text{S}} - 6 = 0$ $\underline{\text{S}} = +6$ $\therefore \text{S} = +6$
	(iv)	H_2O_2 $\text{H}_2\underline{\text{O}}_2 = 0$ $(+1 \times 2) + 2\underline{\text{O}} = 0$ $2 + 2\underline{\text{O}} = 0$ $\underline{\text{O}} = -2$ $\underline{\text{O}} = -1$ $\therefore \text{O} = -1$
	(c)	Calculate the percentage composition by mass of the underlined element in the following compounds:
	(i)	H_2SO_4 Molecular mass of the compound = $2 + 32 + (16 \times 4)$ = 98 Sulphur = 32 $\Rightarrow 32/98 \times 100\% = 32.65\%$. \therefore The percentage composition of sulphur is 32.65%.
	(ii)	$\text{Ca}(\text{NO}_3)_2$ Molecular mass of the compound = $40 + (14 + 48)2$ = 164 Calcium = 40 $\Rightarrow 40/164 \times 100\% = 24.39\%$. \therefore The percentage composition of calcium is 24.39%.

2015

- (b) Give three differences between the following:

- (i) Electrovalent compounds and covalent compounds.

Electrovalent Compounds	Covalent Compounds

- (ii) Solutions and suspensions.

Solutions	Suspensions

- (b) Give three differences between the following:

- (i) Electrovalent compounds and covalent compounds.

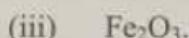
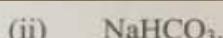
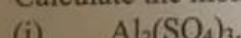
Electrovalent Compounds	Covalent Compounds
Involve transfer of electrons.	Involve sharing of electrons.
Are electrolytes.	Are non-electrolytes.
Have high boiling and melting points.	Have low boiling and melting points.

- (ii) Solutions and suspensions.

Solutions	Suspensions
Are transparent.	Are opaque.
Are homogeneous.	Are heterogeneous.
Particles are completely dissolved.	Particles are not completely dissolved.

2015

- (b) Calculate the molar mass of each of the following compounds:



- (c) State whether each of the following is a chemical or physical change:

(i) Burning of charcoal.....

(ii) Rusting of iron sheets.....

6. (a) State two chemical properties of water.

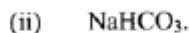
(i) It changes anhydrous copper (II) sulphate from white to blue.
(ii) It changes anhydrous cobalt (II) chloride from blue to pink.

- (b) Calculate the molar mass of each of the following compounds:



$$\begin{aligned}M \cdot M &= (27 \times 2) + (32 \times 3) + (16 \times 12) \\&= (54 + 96 + 192) \text{ g/mol}\end{aligned}$$

Molar mass = 342 g/mol



$$\begin{aligned}M \cdot M &= 23 + 1 + 12 + (16 \times 3) \\&= 23 + 1 + 12 + 48 \\&= 84\end{aligned}$$

Molar mass = 84 g/mol



$$M \cdot M = (56 \times 2) + 16 \times 3$$

$$= 112 + 48$$

Molar mass = 160 g/mol

- (c) State whether each of the following is a chemical or physical change:

(i) Burning of charcoal..... Chemical change.....

(ii) Rusting of iron sheets..... Chemical change.....

2015

8. (a) Calculate the oxidation number of the underlined elements:

(i) $\text{K}_2\text{C}_2\text{O}_4$	(ii) $\text{S}\underline{\text{O}}_3^{2-}$

8. (a) Calculate the oxidation number of the underlined elements:

(i) $\text{K}_2\text{C}_2\text{O}_4$	(ii) $\text{S}\underline{\text{O}}_3^{2-}$
$\text{S} \text{O}_4^{\text{2-}}$ $\text{K}_2\underline{\text{C}}_2\text{O}_4 = 0$ $(1 \times 2)\text{H}(1 \times 2) + (-2 \times 4) = 0$ $2 + 2\text{C} + (-8) = 0$ $2\text{C} = +8 - 2$ $\frac{2\text{C}}{2} = \frac{6}{2}$ $\text{C} = +3$	$\text{S} \text{O}_3^{\text{2-}}$ $\underline{\text{S}}\text{O}_3^{\text{2-}}$ $\underline{\text{S}}\text{O}_3 = -2$ $\text{S} + (-2 \times 3) = -2$ $\text{S} - 6 = -2$ $\text{S} = 6 - 2$ $\text{S} = +4$ $\therefore \text{S} = +4$

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10. (a) Define the following terms:

(i) Empirical formula

.....

(ii) Molecular formula

.....

(b) A compound consists of 85.7% carbon and 14.3% hydrogen by mass. If its relative molecular mass is 56. Calculate:

(i) Empirical formula.

(ii) Molecular formula.

10. (a) Define the following terms:

- (i) Empirical formula ...is...the...simplest...formula...
.....expressing...it...composition...by...mass.....
.....
- (ii) Molecular formula ...is...the...formula...of...compound...showing
.....number...of...each...kind...of...atom...in...present
.....of...one...molecule...to...form...compound.....

(b) A compound consists of 85.7% carbon and 14.3% hydrogen by mass. If its relative molecular mass is 56. Calculate:

- (i) Empirical formula.

Element	C	H
Percentage given	85.7	14.3
R.M.M	$\frac{12}{7.14}$	$\frac{1}{7.14} = 14.3$
Divide smallest ratio	$\frac{7.14}{7.14} = 1$	$\frac{14.3}{7.14} = 2$

$$E.F = C_2H_4$$

- (ii) Molecular formula.

Soln

$$(E.F)_n = M.F$$

$$(E.F)_n = R.M.M$$

$$(C_2H_4)_n = 56$$

$$12n + 2n = 56$$

$$\frac{14n}{14} = \frac{56}{14}$$

$$n = 4$$

$$(C_2H_4)_4 = C_8H_{16}$$

$$\text{Molecular formula} = C_8H_{16}$$