Nitrogen Oxygen Fire Extinguisher and Buoyancy

Nitrogen

(a) Introduction:

symbol: ${}^{41}_{7}N$

Electric configuration: $1s^2, 2s^2, 2p^3$

Atomic number: 7

Molecular formula: N_2

Mass number: 14

Valency:3

(b) Occurrence of Nitrogen:

Nitrogen occurs both in free as well as in combined state.

(i) In free state it occurs in air.

(ii) In combined state it occurs in the following forms-

- Nitrogen occurs as mineral nitrates. Potassium nitrate of Indian saltpeter (KNO_3). Sodium nitrate or chile saltpeter ($NaNO_3$)
- Nitrogen is present in the form of free ammonia in air at such places, where vegetable or animal matter decay.
- During thunder and lightning, oxides of nitrogen are produced. Exhaust of automobiles also gives off oxides or nitrogen.
- It is an important constituent of all living beings where it is present in the form of proteins and amino acids.

(c) Methods of Preparation of Nitrogen:

(i) When the saturated equimolar solution of sodium nitrite and ammonium chloride are heated gently, the following reaction takes place with the liberation of nitrogen gas.

$$\underset{\text{Ammonium chloride}}{NH_4Cl(aq)} + \underset{\text{Sodium nitrite}}{NaNO_2(aq)} \xrightarrow{\Delta} \underset{\text{Sodium chloride}}{NaCl(aq)} + \underset{\text{Ammonium nitrite}}{NH_4NO_2(aq)}$$

$$\underset{\text{Ammonium nitrite}}{NH_4NO_2(aq)} \xrightarrow{\Delta} \underset{\text{Water}}{2H_2O(\ell)} + \underset{\text{Nitrogen}}{N_2(g)}$$

(ii) By heating ammonium dichromate crystals: When crystals of ammonium dichromate are heated, they swell up and produce brilliant flashes, with the liberation of nitrogen gas. The residue is green in colour due to the formation of charomium oxide.

$$\underset{\text{Ammonium dichromate}}{(NH_4)_2Cr_2O_7(s)} \xrightarrow{\Delta} \underset{\text{Chromium oxide}}{Cr_2O_3(s)} + \underset{\text{Water}}{4H_2O(\ell)} + \underset{\text{Nitrogen}}{N_2(g)}$$

(iii) By the oxidation of ammonia with hot metallic oxides: When ammonia gas is passed over the hot oxides of less active metals, such as copper oxide, lead oxide etc., it reduce them to metals with the liberation of nitrogen gas.

$$\underset{\text{Copper oxide}}{3CuO(s)} + \underset{\text{Ammonia}}{2NH_3(g)} \xrightarrow{\Delta} \underset{\text{Copper}}{3Cu(s)} + \underset{\text{Water}}{3H_2O(\ell)} + \underset{\text{Nitrogen}}{N_2(g)}$$

$$\underset{\text{Lead oxide}}{3PbO(s)} + \underset{\text{Ammonia}}{2NH_3(g)} \xrightarrow{\Delta} \underset{\text{Lead}}{3Pb(s)} + \underset{\text{Water}}{3H_2O(\ell)} + \underset{\text{Nitrogen}}{N_2(g)}$$

(d)Physical properties of Nitrogen

(i) It is colourless, tasteless and odourless gas

(ii) Solubility in water: It is practically insoluble in water under laboratory conditions however it in slightly soluble in water in nature.

(iii) Vapour density: It is as heavy as air, as its vapour density is 14 and that of air is 14.4

(iv) Liquefaction: Under high pressure and low temperature it can be liquefied and then solidified the freezing point of nitrogen is 209.8°Cand boiling point is -195.8°C

(v) Nature: It is non poisonous in nature But animals do not survive in its atmosphere due to the absence of oxygen.

(e) Chemical Properties of Nitrogen:

(i) Action with litmus: Nitrogen is neutral towards litmus solution, thus it is neither acidic nor basic in nature.

(ii) Nitrogen is neither combustible nor it supports combustion.

(iii) Action with non-metals:

(A) Action with hydrogen: When three volumes of dry hydrogen gas and one volume of dry nitrogen gas are compressed to 200 atmosphere and passed over heated iron (catalyst) containing molybdenum (promoter) at 400-500°C, they react of form ammonia gas.

This reaction is called Haber's reaction.

$$N_2(g) + 3H_2(g) \underset{\substack{400\text{-}500^\circ C \\ 200\text{ atm}}}{\overset{(Fe + MO)}{\rightleftharpoons}} 2NH_3(g) + Heat$$

(B) Action with oxygen: When equal volume of nitrogen gas and oxygen gas at low pressure are electrically sparked, they react at 300°C to form nitric oxide. This reaction takes place in atmosphere during lightning.

$$N_2(g) + O_2(g) \underset{\text{Spark}}{\overset{\text{Electric}}{\rightleftharpoons}} 2NO(g)$$

(iii) Action with metals: Burning metals such as calcium, magnesium and aluminium continue burning in the atmosphere of nitrogen to form their respective nitrides.

$$\underset{\text{Calcium}}{3Ca(s)} + \underset{\text{Nitrogen}}{N_2(g)} \longrightarrow \underset{\text{Calciumnitride}}{Ca_3N_2(s)}$$

$$\underset{\text{Magnesium}}{3Mg(s)} + \underset{\text{Nitrogen}}{N_2(g)} \longrightarrow \underset{\text{Magnesiumnitride}}{Mg_3N_2(s)}$$

$$\underset{\text{Aluminium}}{2Al(s)} + \underset{\text{Nitrogen}}{N_2(g)} \longrightarrow \underset{\text{Aluminiumnitride}}{2AlN(s)}$$

(f) Uses of Nitrogen:

(i) In the manufacture of fertilizers: Nitrogen is converted into ammonia by Haber's process. Ammonia is then used in the manufacture of fertilizers such as urea, ammonia sulphate, calcium ammonia nitrate and ammonium phosphate.

(ii) Electric bulbs: Sometimes electric bulbs are field with nitrogen at low pressure to prevent the oxidation of tungsten filament.

(iii) As refrigerant: The liquid nitrogen has boiling point – 195.8ºC. Thus, it is used in preserving blood, eye, cornea etc.

(iv) Preserving tinned foods: Nitrogen is filled in the tin containers containing food. The inert atmosphere of nitrogen prevents bacterial growth.

(v) Liquid nitrogen is used during skin grafting in burn victims and for in vitro fertilization.

(vi) Nitrogen gas is used to provide an inert atmosphere in a large number of hazardous industrial processes.

(i) Nitrogen Cycle:

Nitrogen is essential for growth as it is present in proteins and nucleic acids and thus it forms an important part of bio-geochemical cycles.

"Nitrogen cycle is a global cycle in which nitrogen atoms are cycled between various forms of life, atmosphere and soil by a series of interlinked chemical charges."

(i) Nitrogen Fixation: Nitrogen in the element form cannot be used by living system. First it has to be converted into nitrates for the use of plants. This can be done either by industrial nitrogen fixation or by some nitrogen fixing bacteria. Azotobacter and Rhizobium are nitrogen fixing bacteria which can convert the atmospheric nitrogen directly into nitrates. Nitrogen fixation also occurs during lightning and thunder.

(ii) Nitrogen assimilation: Soil nitrates are absorbed by plants and are converted into proteins in them. These proteins are then passed from one trophic level to another.

(iii) Ammonification: Organic matter of plant and animal origin is decomposed to ammonia and amino acids by micro organisms in soil. The process of ammonia formation is called ammonification.

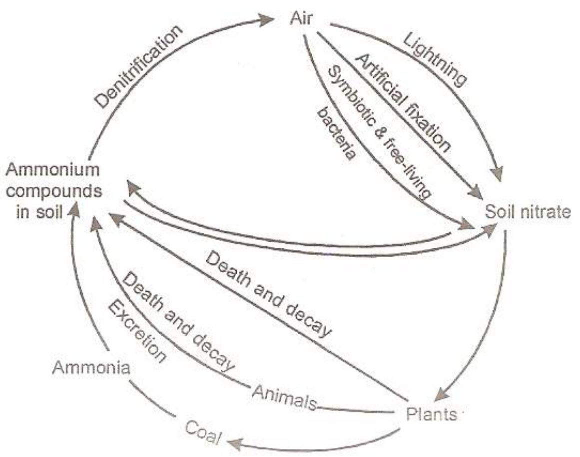
$$\mathrm{Pr}\,oteins \longrightarrow \mathrm{Amin}\,o\ Acids \longrightarrow Ammonia \longrightarrow Ammonium\ compounds\ in\ soil$$

(iv) Nitrification: Some micro organisms covert ammonia into nitrates. The nitrification.

The bacteria, Nitrosomonas (coverts ammonia compounds into nitrites) and Nitrobacter (converts nitrites into nitrates), are actually responsible for nitration.

(iv) Denitrification:

Some bacteria (decomposers) reduce nitrates back to nitrogen or to ammonia. The process is called denitrification. The bacterium involved in denitrification is Pseudomonas denitrificans.



NITROGEN CYCLE

Important points:

(i) Scheele, in 1772, showed that air is a mixture of two gases: fire air (oxygen) and foul air (nitrogen).

(ii) Daniel Rutherford named foul air as mephitic air (killer of life)

(iii) Later on the element was found to be present in nitre (KNO_3) and was named nitrogen.

(iv) The properties of this gas were studied by Antoine Lavoisier.

(v) Nitrogen forms 75% by mass and 78% by volume of air.

(vi) Fritz Habel received Nobel Prize for Haber's process in 1919.

(vii) Oxides of nitrogen: Nitrogen forms a number of oxide. The well known oxides of nitrogen are-

(A) Nitrous oxide, N_2O

(B) Nitric oxide, NO

(C) Nitrogen trioxide, N_2O_3

(D) Nitrogen dioxide or Dinitrogen tetra oxide, NO_2 or N_2O_4 and

(E) Nitrogen pentoxide N_2O_5

(viii) Nitrous oxide is known as "Laughing gas" and N_2O_5 is the only oxide of nitrogen which is solid at room temperature. The rest are gases.

(ix) Oxyacids or Nitrogen: Nitrogen forms a number of oxyacids. The most common and important oxyacids are-

(A) Nitrous acid, HNO_2 and

(B) Nitric acid, HNO_3

(x) Nitric acid, HNO_3 is called aqua forties (meaning strong water).

(xi) Active nitrogen: When an electric discharge allowed to pass through nitrogen under very low pressure (about 2 mm of Hg), a brilliant luminescence is observed which persists for sometime after the stoppage of the discharge. It is observed that nitrogen after the discharge is more active. This nitrogen is termed as active nitrogen.

(xii) Ammonium nitrate (NH_4NO_3) is commonly used ass fertilizer and it is made from ammonia gas (NH_3) and nitric acid (HNO_3).

(xiii) When nitrogen gas is passed over calcium carbide heated to 1000ºC, it reacts to form a mixture of calcium cyanamide ($CaCN_2$) and carbon, which is an important fertilizer known as nitrolim.

(xiv) Nitrogen is a major component of air and can be obtained on a large scale from it. In order to separate the major components of air, it is first purified, then liquefied and finally fractionally distilled.

Oxygen

(a) Introduction

symbol: ${}^{16}_{8}O$

electronic configuration : $1s^2, 2s^2, 2p^4$

Atomic number: 8

Molecular formula: O_2

Mass number: 16

Valency: 2

(b) Occurrence:

(i) It occurs in the atmosphere (23% by mass and 21% by volume) in the form of diatomic molecules (O_2)

(ii) Oxygen is a large part of nearly all the rocks and is present to the extent of 89% by weight in water.

(c) Structure of Oxygen:

In diatomic oxygen molecule two oxygen atoms are bonded by a double bond.

(d) Methods of Preparation of oxygen:

(i) By heating potassium permanganate ($KMnO_4$): We take about 0.5 g of $KMnO_4$ in a boiling tube and heat it over the flame. We collect the evolved gas in jar inverted over water in a trough by downward displacement or water.

$$\underset{\text{Potassium permanganate}}{2KMnO_4(s)} \xrightarrow{Heat} \underset{\text{Potassium manganate}}{K_2MnO_4(s)} + \underset{\text{Manganese dioxide}}{MnO_2(s)} + \underset{\text{Oxygen}}{O_2(g)}$$

(ii) By heating potassium chlorate ($KClO_3$):- It involves heating of a mixture of potassium chlorate and manganese dioxide in the ratio of 4:1 $KClO_3$ evolves oxygen at 375ºC. At this temperature, it melts and coverts into potassium per chlorate which decomposes at higher temperature to evolve oxygen. When MnO_2 is added, it starts giving oxygen at 250ºC. Thus MnO_2 acts as a catalyst. The mixture of $KClO_3$ and MnO_2 is called oxygen mixture. MnO_2 used fjord this purpose should be completely free from carbon as $KCLO_3$ and carbon mixture is explosive in nature.

$$\underset{\text{Potassium chlorate}}{4KClO_3(s)} \longrightarrow \underset{\text{Potassium chloride}}{KCl(s)} + \underset{\text{Potassium perchlorate}}{3KClO_4(s)}$$

$$\underset{\text{Potassium Perchlorate}}{KClO_4(s)} \xrightarrow{648K} \underset{\text{Potassium chloride}}{KCl(s)} + \underset{\text{Oxygen}}{2O_2(g)}$$

(iii) It is also obtained by **electrolysis of water.**

$$\underset{\text{Water}}{2H_2O(\ell)} \xrightarrow{Electrolysis} \underset{\text{Hydrogen}}{2H_2(g)} + \underset{\text{Oxygen}}{O_2(g)}$$

(iv) Oxygen can also be obtained on a large scale by fractional distillation of air (as explained in the preparation of nitrogen).

(e) Physical Properties of Oxygen:

(i) Oxygen is a colourless and odourless gas.

(ii) Oxygen is heavier than air

(iii) Oxygen is slightly soluble in water

(iv) Oxygen can be liquefied to a pale blue liquid, commercially called liquid oxygen 'LOX' (boiling point -183ºC) by compressing the gas to very low temperature. Oxygen transforms to a blue solid on further cooling (freezing point -218.4ºC).

(f) Chemical Properties of Oxygen:

(i) Oxygen supports combustion.

e.g.

$$\underset{\text{Methane}}{CH_4(g)} + \underset{\text{Oxygen}}{2O_2(g)} \longrightarrow \underset{\text{Carbon}}{CO_2(g)} + \underset{\text{Water}}{2H_2O(g)} + Heat$$

This reaction is a combustion reaction as it involves burning of methane in oxygen with the liberation of large amount of energy.

(ii) Oxidation Reactions: A reaction in which oxygen is added to an element or a compound is called oxidation.

e.g.

(A) Magnesium burns in air to form a white powder (magnesium oxide)

$$\underset{\text{Magnesium}}{2Mg(s)} + \underset{\text{Oxygen}}{O_2(g)} \longrightarrow \underset{\text{Magnesium oxide}}{2MgO(s)}$$

(B) When charcoal is burnt in oxygen it forms carbon dioxide.

$$\underset{Carbon}{C(s)} + \underset{Oxygen}{O_2(g)} \longrightarrow \underset{Carbon dioxide}{CO_2(g)}$$

(C) Sulphur burns is oxygen more vigorously than air and forms its oxide SO_2 which has a pungent smell.

$$\underset{Sulphur}{S(s)} + \underset{Oxygen}{O_2(g)} \longrightarrow \underset{Sulphur dioxide}{SO_2(g)}$$

(D) Phosphorus burns in oxygen to form phosphorus pentoxide

$$\underset{Phosphorus}{4P(s)} + \underset{Oxygen}{5O_2(g)} \longrightarrow \underset{Phosphorus\ pentoxide}{2P_2O_5(s)}$$

(E) Iron also burns in oxygen without a flame.

$$\underset{Iron}{3Fe(s)} + \underset{Oxygen}{2O_2(g)} \longrightarrow \underset{Iron(II,III)Oxide}{Fe_3O_4(s)}$$

(F) Rusting of Iron: The slow conversion of iron into its hydrated oxide, tin the presence of moisture and air is called rusting, whereas the hydrated oxide or iron is called rust.

$$\underset{Iron}{4Fe(s)} + \underset{Oxygen}{3O_2(g)} \longrightarrow \underset{Ferric\ oxide}{2Fe_2O_3(s)}$$

$$\underset{Ferric\ oxide}{Fe_2O_3(s)} + \underset{Water}{\times H_2O(\ell)} \longrightarrow \underset{Hydrated\ ferric\ oxide\ (rust)}{Fe_2O_3.\times H_2O(s)}$$

(g) Uses of Oxygen.

(i) Major use of oxygen is for breathing. It is carried in cylinders by mountaineers, deep-sea divers and astronauts.

(ii) In industries, oxygen is blown through molten iron to purify it. Then carbon & other metals are added.

(iii) Oxygen mixed with helium or carbon dioxide is known as carbogen that is used for artificial respiration.

(iv) Liquid oxygen is an important constituent of fuels used in rockets.

(v) Liquid oxygen mixed with finely divided carbon acts like a dynamite in coal mining.

(vi) Oxygen is used for production of oxy-hydrogen or oxy-acetylene flame which are employed for cutting and welding purposes.

(vii) Oxygen is used as an oxidizing agent in several reactions.

(viii) In explosives, cartridges made of 1 part of coal dust, 1 part of petroleum jelly and 8 parts of LOX are used for blasting rocks.

Important points:

(i) Priestley and Scheele obtained oxygen within a few months of each other by heating suitable oxygen compounds.

(ii) Scheele called it vital air or fire air.

(iii) Lavoisier regarded it as an essential constituent of all acids and named it oxygen (oxus-acid, gannas-maker).

(iv) Oxygen is the most abundant element and forms about one half of the earth's crust.

(v) The three isotopes of oxygen are ^{16}O, ^{17}O and ^{18}O. It also exhibits allotropy and its allotrope is ozone O_3.

Fire Extinguisher

A device used to put off fire is called a fire extinguisher. Various types of fire extinguishers are used for different types of fires.

Types of fire extinguisher:

(a) Water as a Fire Extinguisher:

(i) Principle: When water is thrown on fire, it cools the combustible substance below its ignition temperature (kindling temperature) and the fire is extinguished. The water vapours also surround the combustible material and thus help in cutting off the supply of air.

(ii) Limitations:

- Water cannot be used for extinguishing oil fires because being heavier it sinks down and the oil comes up and continues to burn.
- Water cannot be used to put off fires in electrical wiring a water conducts electricity and may result in the electrocution of the person involved.

(b) Foam Type Fire Extinguisher:

(i) Principle: This is based on the principle of extinguishing fire by cutting off air supply to the burning substance.

(ii) Structure: It contains a solution of aluminium sulphate in the bottle and a saturated solution of sodium bicarbonate in the metallic cylinder. Saponin is added to sodium bicarbonate solution to produce foam.

(iii) Working: When the knob of a foam type fire extinguisher is pressed, the glass bottle containing aluminium sulphate solution breaks and comes in contact with the sodium bicarbonate solution. The following reaction takes place.

$$\underset{Aluminium\ sulphate}{Al_2(SO_4)_3} + \underset{Sodium\ bicarbonate}{6NaHCO_3} \longrightarrow \underset{Aluminium\ hydroxide}{2Al(OH)_3} + \underset{Carbon\ dioxide}{6CO_2} + \underset{Sodium\ sulphate}{3Na_2SO_4}$$

Due to presence of saponin, a stable foam of CO_2 is formed. The CO_2 foam comes out of the fire extinguisher with great pressure and covers the entire surface of burning oil. This cuts off the supply of air to the burning oil and hence the fire is extinguished.

(iv) Uses: It is used for-

extinguishing fire caused by burning oil.

extinguishing fire caused by petrol at petrol pumps, in oil tanks etc.

(c) Carbon Tetrachloride Fire Extinguisher:

(i) Principle: CCl_4 fire extinguisher is based on the principle of extinguishing fire by cutting off the air supply to the burning substance.

(ii) Working: When CCl_4 is pumped out from the extinguisher, it vaporizes on coming in contact with the burning material. Since CCl_4 vapours are heavier than air they settle down on the burning material and cut off the air supply. The fire gets extinguished.

(iv) Uses:

Carbon tetrachloride fire extinguisher is used for extinguishing fire caused by electricity.

(d) Soda Acid Fire Extinguisher:

(i) Principle: It extinguishes fire by cooling the burning substance below its ignition temperature and by cutting off the supply of air.

(ii) Structure: A soda acid fire extinguisher consists of a metallic cylinder having a knob and a nozzle tube. The cylinder is filled with a saturated solution of solution bicarbonate. A glass bottle containing conc. H_2SO_4 is kept inside the metal cylinder. When we strike the knob of the extinguisher against a hard surface the acid bottle breaks and the acid comes in contact with the solution of $NaHCO_3$.

$$\underset{\text{Sodium bicarbonat}}{2NaHCO_3} + \underset{\text{Sulphuric acid}}{H_2SO_4} \rightarrow \underset{\text{Sodium sulphate}}{Na_2SO_4} + \underset{\text{Water}}{2H_2O} + \underset{\text{Carbon dioxide}}{2CO_2} \uparrow$$

(iii) Working: The CO2 produced exerts pressure and forces the water solution out through the nozzle. The mixture of the liquid and CO2 extinguishes the fire. Water helps in lowering the temperature of the combustible substance below its ignition temperature and CO2 helps enveloping the combustible substance and cutting off the supply of air to the combustible substance.

Buoyancy

(a) Pressure exerted by a water column

$$P\frac{thrust}{area} = \frac{ah\rho g}{a} = h\rho g$$

where h = height of water column

ρ = density of water

g = acceleration due to gravity

(b) Buoyancy and force of buoyancy (Buoyant force):

When a body is immersed in a fluid (liquid or gas) it displaces the liquid, whose volumes is equal to the volume of the body immersed in the fluid. The fluid exerts an upward force on the body. This tendency of the fluid (exerting an upward force) is called the force of buoyancy or buoyant force.

Example: When a bulled out of a well, it is felt lighter so long as it remains immersed in water, inside the well. It acquires its actual weight when it is out of water.

(c) Archimedes's principle:

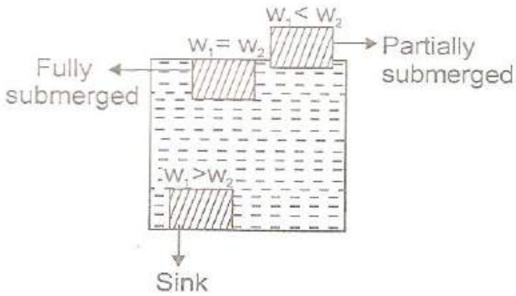
Archimedes Principle states that: When a body is immersed in liquid partially or completely, it experiences an up thrust equal to the weight of the liquid displaced"

Gases also exert a buoyant force, however, the buoyant force due to gases is negligible.

Immersion of a body in a Fluid (Liquid):

When a body is immersed in a liquid W_1 (weight of the body in air) acts vertically downwards trying to sink the body. The upthurst or buoyancy force W2 (equal to weight of the liquid displaced) acts upwards.

Different Cases: The following three cases may arise:



(A) When $W_1 > W_2$: Weight of the body is greater than the weight of the liquid displaced. This happens when density of the body is greater than density of the liquid.

The body will sink in liquid.

(B) When $W_1 = W_2$: i.e., weight of the body is equal to weight of the liquid displaced. This happens when density of the body is equal to density of the liquid.

The body will float just inside the liquid.

(C) When $W_1 < W_2$: Weight of the body is less than weight of the liquid displaced. This happens when the density of the body is less than the density of the liquid.

The body will float partially above the liquid surface. Only that portion of the body will be immersed by which the weight of the liquid displaced balances the total weight of the body.

EXERCISE

1. Natural of nitrogen towards litmus is-
(A) acidic (B) basic
(C) neutral (D) none

2. Which statement is not true about nitrogen?
(A) It is insoluble in water
(B) It is a colourless gas.
(C) It is poisonous in nature
(D) It is as heavy as air.

3. Which of the following is used in making artificial smoke and clouds on stges?
(A) Liquid oxygen
(B) Liquid hydrogen
(C) Liquid carbon dioxide
(D) Liquid nitrogen

4. When a burning splinter is taken in a gas jar filled with nitrogen then-
(A) it burns more fast
(B) it is extinguished
(C) it burns with explosion
(D) it is not affected

5. Which of the following is formed when metals react with nitrogen?
(A) Nitrates (B) Nitrites
(B) Nitrides (D) None of these

6. Space crafts or rockets going into space must carry-
(A) liquid oxygen
(B) liquid hydrogen
(C) liquid nitrogen
(D) liquid carbon dioxide

7. The formula of rust is-
(A) $Fe_2O_3.\times H_2O$ (B) Fe_2O_3
(C) $FeO.\times H_2O$ (D) None

8. The formula of oxygen in air is-
(A) $\frac{1}{4} th\ of\ the\ volume$
(B) $\frac{1}{6} th\ of\ the\ volume$
(C) $\frac{1}{5} th\ of\ the\ volume$
(D) $\frac{1}{3} th\ of\ the\ volume$

9. A mixture has four parts of potassium chlorate and one part of manganese dioxide. The mixture so formed is called-
(A) manganese mixture (B) oxygen mixture
(C) catalytic mixture (D) nitrogen mixture

10. In what direction doe the buoyant force by liquid acts on an object?
(A) Vertically upward (B)Vertically downward
(C) Both (A) and (B) (D) None of these

11. A body will sink in a liquid when-
(A) the weight of the body in air is equal to the upthrust.
(B) the weight of the body in air is less than the upthrust.
(C) the weight of the body in air is greater then the upthrust.
(D) None of these

12. Loss of weight of a body immersed in a liquid is-
(A) equal to the weight of liquid displaced.
(B) more than the weight of liquid displaced
(C) less than the weight of liquid displaced
(D) zero

13. In foam type fire extinguisher, which of the following products are formed when the following equation occurs?

$$Al_2(SO_4)_3 + 6NaHCO_3 \longrightarrow ?$$

(A) $3Al(OH)_3 + 6H_2O + 2Na_2SO_4$
(B) $2Al(OH)_3 + 6CO + 3Na_2SO_4$
(C) $3Al(OH)_3 + 6O_2 + 2Na_2SO_4$
(D) $2Al(OH)_3 + 6CO_2 + 3Na_2SO_4$

14. Which component of air is used in fire extinguishers?
(A) Oxygen (B) Nitrogen
(C) Carbon dioxide (D) None of these

15. Water cannot be used to extinguish oil fires because-
(A) it is a poor conductor of electricity.
(B) it is lighter than oil.
(C) it is heavier than oil
(D) it's B.P. is high

16. Sodium bicarbonate is used in fire extinguisher because it produces **(NTSE-Satge-I/Raj/2007)**
(A) carbon dioxide gas (B) water
(C) foam (D) sodium oxide

17. Which of the following compounds does not produce oxygen? **(NTSE-Satge-I/2008)**
(a) Potassium paramagnet (b) Potassium chlorate
(c) Water (d) Salt

ANSWER – KEY

Q.	1	2	3	4	5	6	7	8	9	10
A.	C	C	D	B	C	A	A	C	B	A
Q.	11	12	13	14	15	16	17			
A.	C	A	D	C	C	A	D			