With the Help of Charcoal to Get Absorption of Poisonous Gases Such as CO, CO_2, NO_X, SO_X,VOC, CFCs, NH_3, and CH_4 rtc can be Electrolyte and Converted into Electricity

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Abstract

Admittedly that mostly harmful gases creates pollution in the environment so it's inconvenient to take breadth for human beings. It has been impossible to decline the amount of pollution from atmosphere which has insecure for human beings to survive in contaminated areas so that this project has been made a theory that how can convert smoginess into electricity . There are three main steps which has been given below :-

1. Charcoal is used for getting adsorption to adhere gases towards its surface because, it is a ideal technique to subordinate its temperature with whom it has got change it into liquid form, due to reducing the temperature of gases below to it's critical temperature, by flowing Ammonia gas inside the cone which is made by pipeline.

2. In the second step, the liquefied gases will be change into electrolyte form by passing UV rays because the liquefied gases are polar in nature although the polar liquefied form dissolve only in water so that it will generate electricity.

3. In the last but not least, it is indispensible that if there might be some gases which hasn't changed in liquid form therefore it would be relocate to another chamber because in that chamber it will get changed by pressurize the gases in case it may be settle for proceeding to convert it into liquid form.

Keywords - *UV rays, electrolyte, Charcoal, pressurize*

I. INTRODUCTION

[1]Charcoal is the lightweight black carbon and ash residue hydrocarbon produced by removing water and other volatile constituents from animal and vegetation substances. Charcoal is usually produced by slow pyrolysis — the heating of wood or other substances in the absence of oxygen Historically, the production of wood charcoal in locations where there is an abundance of wood dates back to a very ancient period, and generally consists of piling billets of wood on their ends so as to form a conical pile, openings being left at the bottom to admit air, with a central shaft to serve as a flue. The whole pile is covered with turf or moistened clay. The firing is begun at the bottom of the flue, and gradually spreads outwards and upwards. The success of the operation depends upon the rate of the combustion. Under average conditions, 100 parts of wood yield about 60 parts by volume, or 25 parts by weight, of charcoal; small-scale production on the spot often yields only about 50%, while large-scale became efficient to about 90% even by the seventeenth century. The operation is so delicate that it was generally left to colliers (professional charcoal burners). They often lived alone in small huts in order to tend their wood piles. For example, in the Harz Mountains of Germany, charcoal burners lived in conical huts called *Köten* which are still much in evidence today.[*when?*]


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An abandoned charcoal kilnnear Walker, Arizona, USA.

The massive production of charcoal (at its height employing hundreds of thousands, mainly in Alpine and neighbouring forests) was a major cause of deforestation, especially in Central Europe.[when?] In England, many woods were managed as coppices, which were cut and regrown cyclically, so that a steady supply of charcoal would be available (in principle) forever; complaints (as early as the Stuart period) about shortages may relate to the results of temporary over-exploitation or the impossibility of increasing production to match growing demand. The increasing scarcity of easily harvested wood was a major factor behind the switch to fossil fuel equivalents, mainly coal and brown coal for industrial use.

The modern process of carbonizing wood, either in small pieces or as sawdust in cast iron retorts, is extensively practiced where wood is scarce, and also for the recovery of valuable byproducts (wood spirit, pyroligneous acid, wood tar), which the process permits. The question of the temperature of the carbonization is important; according to J. Percy, wood becomes brown at 220 °C (428 °F), a deep brown-black after some time at 280 °C (536 °F), and an easily powdered mass at 310 °C (590 °F).[1] Charcoal made at 300 °C (572 °F) is brown, soft and friable, and readily inflames at 380 °C (716 °F); made at higher temperatures it is hard and brittle, and does not fire until heated to about 700 °C (1,292 °F).

In Finland and Scandinavia, the charcoal was considered the by-product of wood tar production. The best tar came from pine, thus pinewoods were cut down for tar pyrolysis. The residual charcoal was widely used as substitute for metallurgical coke in blast furnaces for smelting. Tar production led to rapid local deforestation. The end of tar production at the end of the 19th century resulted in rapid re-forestation of affected areas.[2]

II. PRODUCTION METHODS

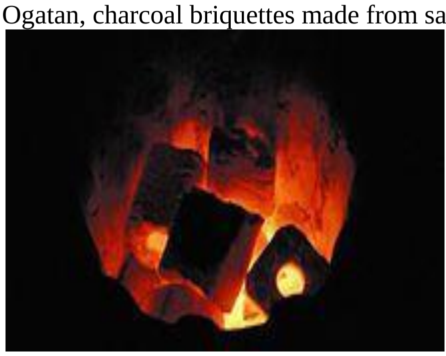
Charcoal has been made by various methods. The traditional method in Britain used a clamp. This is essentially a pile of wooden logs (e.g. seasoned oak) leaning against a chimney (logs are placed in a circle). The chimney consists of 4 wooden stakes held up by some rope. The logs are completely covered with soil and straw allowing no air to enter. It must be lit by introducing some burning fuel into the chimney; the logs burn very slowly and transform into charcoal in a period of 5 days' burning. If the soil covering gets torn (cracked) by the fire, additional soil is placed on the cracks. Once the burn is complete, the chimney is plugged to prevent air from entering.[3] The true art of this production method is in managing the sufficient generation of heat (by combusting part of the wood material), and its transfer to wood parts in the process of being carbonised. A strong disadvantage of this production method is the huge amount of emissions that are harmful to human health and the environment (emissions of unburnt methane).[4] As a result of the partial combustion of wood material, the efficiency of the traditional method is low. Modern methods employ retorting technology, in which process heat is recovered from, and solely provided by, the combustion of gas released during carbonisation. [5]. Yields of retorting are considerably higher than those of kilning, and may reach 35%-40%.

The properties of the charcoal produced depend on the material charred. The charring temperature is also important. Charcoal contains varying amounts of hydrogen and oxygen as well as ash and other impurities that, together with the structure, determine the properties. The approximate composition of charcoal for gunpowders is sometimes empirically described as C_7H_4O. To obtain a coal with high purity, source material should be free of non-volatile compounds.

III. TYPES

Binchōtan, Japanese high grade charcoal made from ubame oak

Ogatan, charcoal briquettes made from sawdust



Burning ogatan

A. Common charcoal is made from peat, coal, wood, coconut shell, or petroleum.

B. Sugar charcoal is obtained from the carbonization of sugar and is particularly pure. It is purified by boiling with acids to remove any mineral matter and is then burned for a long time in a current of chlorine in order to remove the last traces of hydrogen.[6] It was used by Henri Moissan in his early attempt to create synthetic diamonds.[*citation needed*]

C. Activated charcoal is similar to common charcoal but is made especially for medical use. To produce activated charcoal, manufacturers heat common charcoal in the presence of a gas that causes the charcoal to develop many internal spaces or "pores". These pores help activated charcoal trap chemicals.

D. Lump charcoal is a traditional charcoal made directly from hardwood material. It usually produces far less ash than briquettes.

E. Japanese charcoal has had pyroligneous acid removed during the charcoal making; it therefore produces almost no smell or smoke when burned. The traditional charcoal of Japan is classified into two types:

White charcoal (*Binchōtan*) is very hard and produces a metallic sound when struck.
Black charcoal (ja) A more recent type is of factory-made briquettes:

F. Ogatan is made from hardened sawdust. It is most often used in Izakaya or Yakiniku restaurants.
Pillow shaped briquettes are made by compressing charcoal, typically made from sawdust and other wood by-products, with a binder and other additives. The binder is usually starch. Briquettes may also include brown coal (heat source), mineral carbon (heat source), borax, sodium nitrate (ignition aid), limestone (ash-whitening agent), raw sawdust (ignition aid), and other additives.

G. Sawdust briquette charcoal is made by compressing sawdust without binders or additives. It is the preferred charcoal in Taiwan, Korea, Greece, and the Middle East. It has a round hole through the center, with a hexagonal intersection. It is used primarily for barbecue as it produces no odor, no smoke, little ash, high heat, and long burning hours (exceeding 4 hours).

H. Extruded charcoal is made by extruding either raw ground wood or carbonized wood into logs without the use of a binder. The heat and pressure of the extruding process hold the charcoal together. If the extrusion is made from raw wood material, the extruded logs are subsequently carbonized.

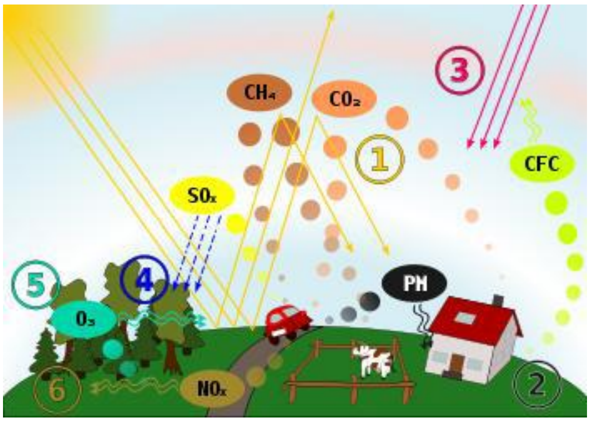
I. Air Pollution

Air pollution occurs when harmful or excessive quantities of substances including gases, particulates, and biological molecules are introduced into Earth's atmosphere. It may cause diseases, allergies and also death of humans; it may also cause harm to other living organisms such as animals and food crops, and may damage the natural or built environment. Human activity and natural processes can both generate air pollution.

IV. POLLUTANTS

Main articles: Pollutant and Greenhouse gas
An air pollutant is a substance in the air that can have adverse effects on humans and the ecosystem. The substance can be solid particles, liquid droplets, or gases. A pollutant can be of natural origin or man-made. Pollutants are classified as primary or secondary. Primary pollutants are usually produced from a process, such as ash from a volcanic eruption. Other examples include carbon monoxide gas from motor vehicle exhaust, or the sulfur dioxide released from factories. Secondary pollutants are not emitted directly. Rather, they form in the air when primary pollutants react or interact. Ground level ozone is a prominent example of a secondary pollutant. Some pollutants may be both primary and secondary: they are both emitted directly and formed from other primary pollutants.

Before flue-gas desulfurization was installed, the emissions from this power plant in New Mexico contained excessive amounts of sulfur dioxide.

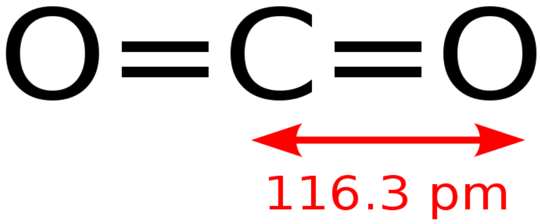


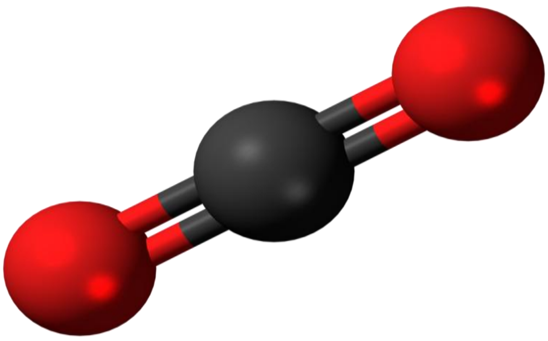
Schematic drawing, causes and effects of air pollution: (1) greenhouse effect, (2) particulate contamination,

(3) increased UV radiation, (4) acid rain, (5) increased ground level ozone concentration, (6) increased levels of nitrogen oxides

Thermal oxidizers are air pollution abatement options for hazardous air pollutants (HAPs), volatile organic compounds (VOCs), and odorous emissions. Substances emitted into the atmosphere by human activity include:

A. Carbon dioxide (CO_2) - Because of its role as a greenhouse gas it has been described as "the leading pollutant"[5] and "the worst climate pollution".[6]Carbon dioxide is a natural component of the atmosphere, essential for plant life and given off by the human respiratory system. [7] This question of terminology has practical effects, for example as determining whether the U.S. Clean Air Act is deemed to regulate CO_2 emissions.[8]CO_2 currently forms about 405 parts per million (ppm) of earth's atmosphere, compared to about 280 ppm in pre-industrial times,[9] and billions of metric tons of CO_2 are emitted annually by burning of fossil fuels.[10] CO_2 increase in earth's atmosphere has been accelerating.[11]

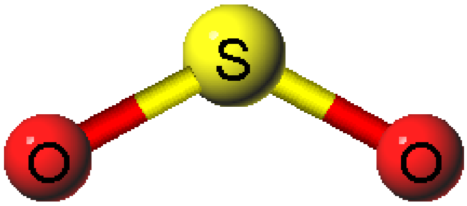


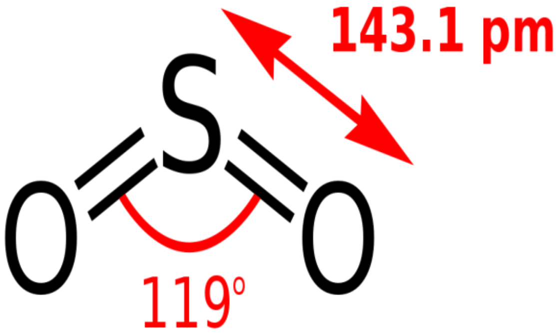


Melting point :- −56.6 °C; −69.8 °F; 216.6 K

Solubility in water :- 1.45 g/L at 25 °C (77 °F), 100 kPa

B. Sulfur oxides (SO_x) - particularly sulfur dioxide, a chemical compound with the formula SO_2. SO_2 is produced by volcanoes and in various industrial processes. Coal and petroleum often contain sulfur compounds, and their combustion generates sulfur dioxide. Further oxidation of SO_2, usually in the presence of a catalyst such as NO_2, forms H_2SO_4, and thus acid rain.[2] This is one of the causes for concern over the environmental impact of the use of these fuels as power sources.

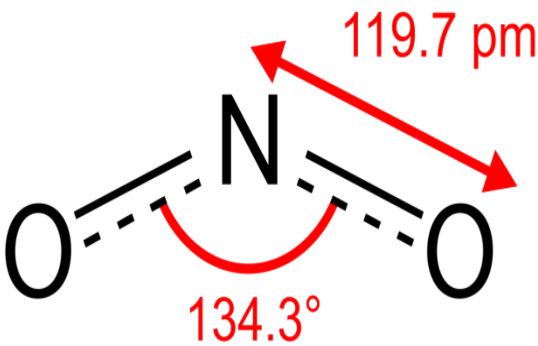


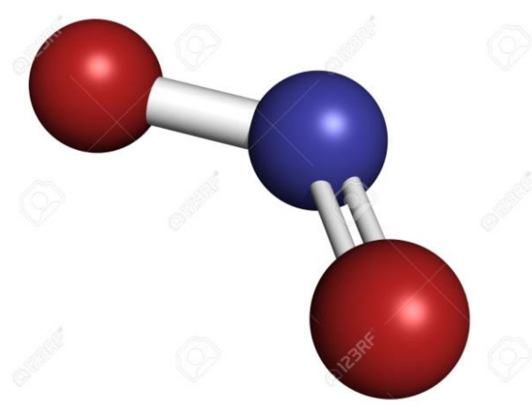


Melting point :- −72 °C; −98 °F; 201 K

Solubility in water :- 94 g/L[2]forms sulfurous acid

C. Nitrogen oxides (NO_x) - Nitrogen oxides, particularly nitrogen dioxide, are expelled from high temperature combustion, and are also produced during thunderstorms by electric discharge. They can be seen as a brown hazedome above or a plume downwind of cities. Nitrogen dioxide is a chemical compound with the formula NO_2. It is one of several nitrogen oxides. One of the most prominent air pollutants, this reddish-brown toxic gas has a characteristic sharp, biting odor.

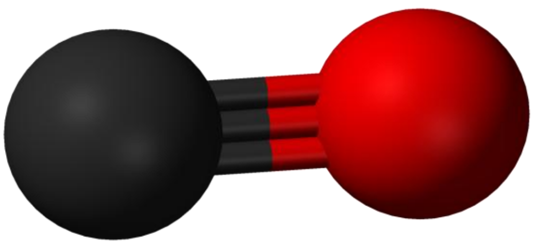




Melting point :- −11.2 °C (11.8 °F; 261.9 K)

Solubility in water :- Hydrolyses

D. Carbon monoxide (CO) - CO is a colorless, odorless, toxic yet non-irritating gas. It is a product of combustion of fuel such as natural gas, coal or wood. Vehicular exhaust contributes to the majority of carbon monoxide let into our atmosphere. It creates a smog type formation in the air that has been linked to many lung diseases and disruptions to the natural environment and animals. In 2013, more than half of the carbon monoxide emitted into our atmosphere was from vehicle traffic and burning one gallon of gas will often emit over 20 pounds of carbon monoxide into the air [12]

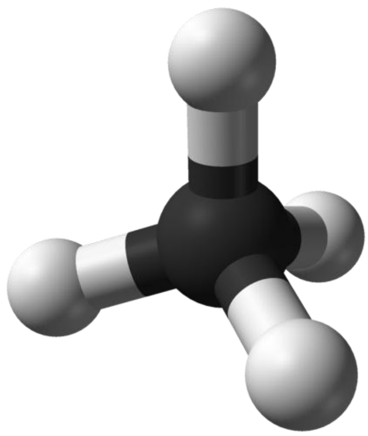


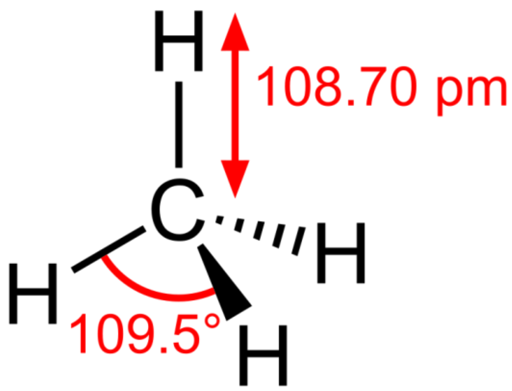
Melting point :- −205.02 °C (−337.04 °F; 68.13 K)

Solubility in water :- 27.6 mg/L (25 °C)

E. Volatile organic compounds (VOC) - VOCs are a well-known outdoor air pollutant. They are categorized as either methane (CH_4) or non-methane (NMVOCs). Methane is an extremely efficient greenhouse gas which contributes to enhanced global warming. Other hydrocarbon VOCs are also significant greenhouse gases because of their role in creating ozone and prolonging the life of methane in the atmosphere. This effect varies depending on local air quality. The aromatic NMVOCs benzene, toluene and xylene are suspected carcinogens and may lead to leukemia with prolonged exposure. 1,3-butadiene is another dangerous compound often associated with industrial use.

Particulates, alternatively referred to as particulate matter (PM), atmospheric particulate matter, or fine particles, are tiny particles of solid or liquid suspended in a gas. In contrast, aerosol refers to combined particles and gas. Some particulates occur naturally, originating from volcanoes, dust storms, forest and grassland fires, living vegetation, and sea spray. Human activities, such as the burning of fossil fuels in vehicles, power plants and various industrial processes also generate significant amounts of aerosols. Averaged worldwide, anthropogenic aerosols—those made by human activities—currently account for approximately 10 percent of our atmosphere. Increased levels of fine particles in the air are linked to health hazards such as heart disease,[13] altered lung function and lung cancer. Particulates are related to respiratory infections and can be particularly harmful to those already suffering from conditions like asthma.[14]



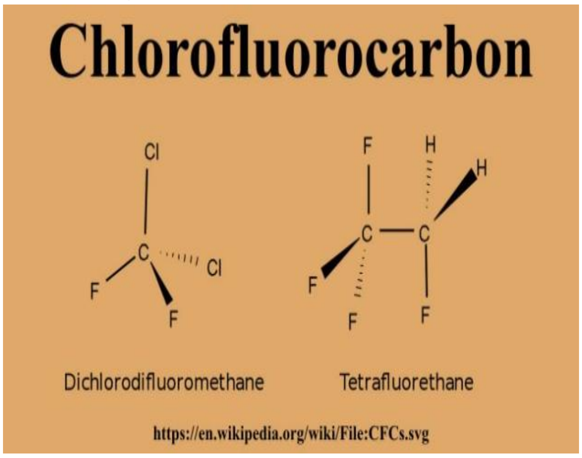


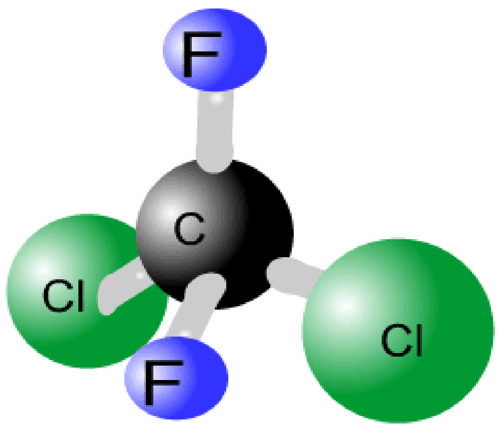
Melting point :- −182.5 °C; −296.4 °F; 90.7 K

Solubility in water :- 22.7 mg·L^{-1}

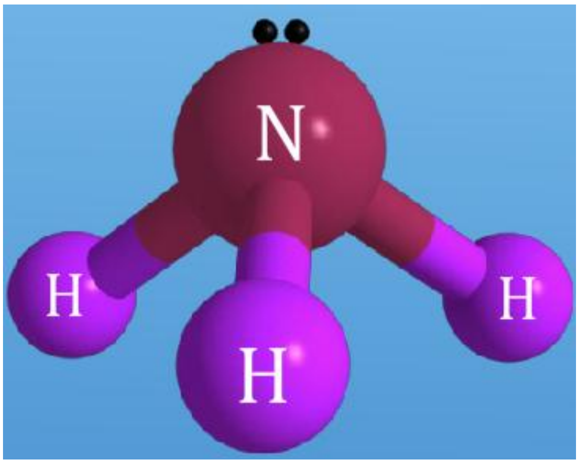
- Persistent free radicals connected to airborne fine particles are linked to cardiopulmonary disease.[15][16]
- Toxic metals, such as lead and mercury, especially their compounds.

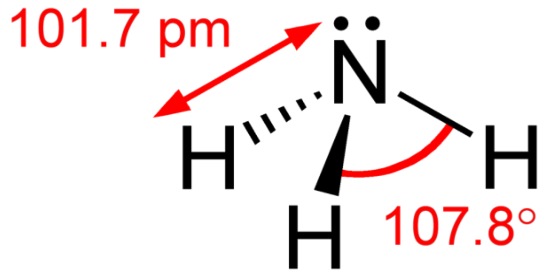
F. Chlorofluorocarbons (CFCs) - harmful to the ozone layer; emitted from products are currently banned from use. These are gases which are released from air conditioners, refrigerators, aerosol sprays, etc. On release into the air, CFCs rise to the stratosphere. Here they come in contact with other gases and damage the ozone layer. This allows harmful ultraviolet rays to reach the earth's surface. This can lead to skin cancer, eye disease and can even cause damage to plants.





G. Ammonia (NH_3) - emitted from agricultural processes. Ammonia is a compound with the formula NH_3. It is normally encountered as a gas with a characteristic pungent odor. Ammonia contributes significantly to the nutritional needs of terrestrial organisms by serving as a precursor to foodstuffs and fertilizers. Ammonia, either directly or indirectly, is also a building block for the synthesis of many pharmaceuticals. Although in wide use, ammonia is both caustic and hazardous. In the atmosphere, ammonia reacts with oxides of nitrogen and sulfur to form secondary particles.[17]





Melting point :- −77.73 °C (−107.91 °F; 195.42 K)

Solubility in water :- 47% w/w (0 °C)
31% w/w (25 °C)
18% w/w (50 °C)

Odours — such as from garbage, sewage, and industrial processes

G. Radioactive pollutants - produced by nuclear explosions, nuclear events, war explosives, and natural processes such as the radioactive decay of radon.

Secondary pollutants include:
Particulates created from gaseous primary pollutants and compounds in photochemical smog. Smog is a kind of air pollution. Classic smog results from large amounts of coal burning in an area caused by a mixture of smoke and sulfur dioxide. Modern smog does not usually come from coal but from vehicular and industrial emissions that are acted on in the atmosphere by ultraviolet light from the sun to form secondary pollutants that also combine with the primary emissions to form photochemical smog.

- Ground level ozone (O_3) formed from NO_x and VOCs. Ozone (O_3) is a key constituent of the troposphere. It is also an important constituent of certain regions of the stratosphere commonly known as the Ozone layer. Photochemical and chemical reactions involving it drive many of the chemical processes that occur in the atmosphere by day and by night. At abnormally high concentrations brought about by human activities (largely the combustion of fossil fuel), it is a pollutant, and a constituent of smog.

Peroxyacetyl nitrate ($C_2H_3NO_5$) - similarly formed from NO_x and VOCs.

V. METHOD

In this experiment, it may be inconvenient because it's too hard to hold gas molecule in a single place. As the address gas molecule have free to move everywhere as like air but according to this experiment Charcoal is used for adsorbing gases around the atmosphere because it as a character of adsorption gas molecules. Thus, first of all it is indispensabe to adsorb the gases from atmosphere Like CO, SO2, CH4 etc. by lowering the temperature of charcoal internally by flowing ammonia gas through pipe. It may be possible that decreasing the temperature of charcoal more and more gases will get adsorbed on the surface of charcoal according to Le chatelier principle so that it will get converted it into liquid form thereafter with gravitational attraction the whole liquefied gas will flow towards container for soluble in water. Furthermore, the whole solution will get electrolyte by passing the UV rays into the mixture for conduct electricity but admittedly every anion or cation cannot stay unstable more than fraction of seconds so that they would make another bonds and there would be some gases who have explosive in nature. Thus, it is necessary to obtain the solution from explosion so it has to be dissolve some externally to stable the condition that's why Dil. HCL will dissolve in solution because it has both partially positive (+) as well as negative (–) charge which cannot break in normal temperature after that it is convenient to conduct electricity. **DATA ANALYSES** Everyone knows that gases such as CO, SO2, NO and CH4 etc has responsible for leading pollutants in the atmosphere. Keep this in view it became necessary to reduce it for some extent because pollution is the main cause of rising global warming. Equipments used for the processing to conduct electricity of atmospheric gases includes:-

- Charcoal : Charcoal is used for adsorption the gas molecules from the atmosphere with whom it will replaced by further in liquid form by sexes of ammonia gas from pipe which has made in conical shape because it is convenient method to adsorb gases for liquefied.

A. *Temperature Controller*

The Temperature controller used to transplant the gases into liquid form which we will electrolyte it by further dilution in water such that we will able to generate electricity.

B. *Condensing Tube*

Condensing tube works as to maintain the temperature so that the liquefied gases will dissolve properly in water because due to atmospheric low pressure or high temperature it would get turn into gaseous form according to Le Chatelier's Principle but there are some gases who have changed their state in gaseous form after cures from condensing tube. Thus there had applied another method which will discuss as follow:-

1. Pressurizer

Pressurizer is used for pressurise the gases because it get changed gaseous into liquid form by lowering of pressure for further it would get transfer in solution.

2. Cooling Unit

Cooling unit works to preserve the pipe's temperature because the gases which will come out in the form of liquified from pressurizer will not change back in their last stage and at least but not last the whole liquefied will be collected in another beaker and the process will going on unless gases will not converted into liqued form.

C. *Dil. HCL*

Before electrolyte the liquified gases it will be indispensable to dissolve Dil. HCL because Dil. HCLworks as to make layers between electrolytic anion or cation for making another bonds which will get harm for solution due to presence of some explosive gases such as CH4 so that the whole project will damage instantally.

D. *Ultraviolet Rays*

UV rays is used for electrolyte the whole solution for turning into anions or cation which will enable to generate electricity. Afterwards electrolytic solution eiher anions or cations will free to move and try to make another bonds to stay stable because both cation and anion have positive and negative charge respectively therefore Dil. HCL also splits in cation and anion (where H^+ act as cation and Cl^- acts as anion) after passing the UV rays. Dil. HCL will make layer around anions or cations present in the solution like H^+ which act as cation will make a layer around anion and Cl^- which act as anion will make a layer around cation because dil. HCL has both partially positive as well as negative charge. Whenever the solution will seems to be stable then it will be able to generate electricity through electrolysis.

E. *Cathode Or Anode Rod*

These two rods has an important role for eneration of electricity because it works as an electrolysis in solution. Cathode rod works for a positive terminal whereas anode rod works for a negative terminal when these rods will be connected to a battery.Moreover, Cathode rod will take electron from the anions and transfer to anode rod through conducting wire while anode rod works as a acceptor of electron then cations will take these electron from anode rod. As a result these flowing of electron will conduct electricity.

VI. CONCLUSIONS

Overall, it is estimated that solubility of liquefied gases depends upon the temperature of charcoal because if plenty of gases will get adsorbed by lowering of charcoal's temperature then majority of gases will get liquefied.

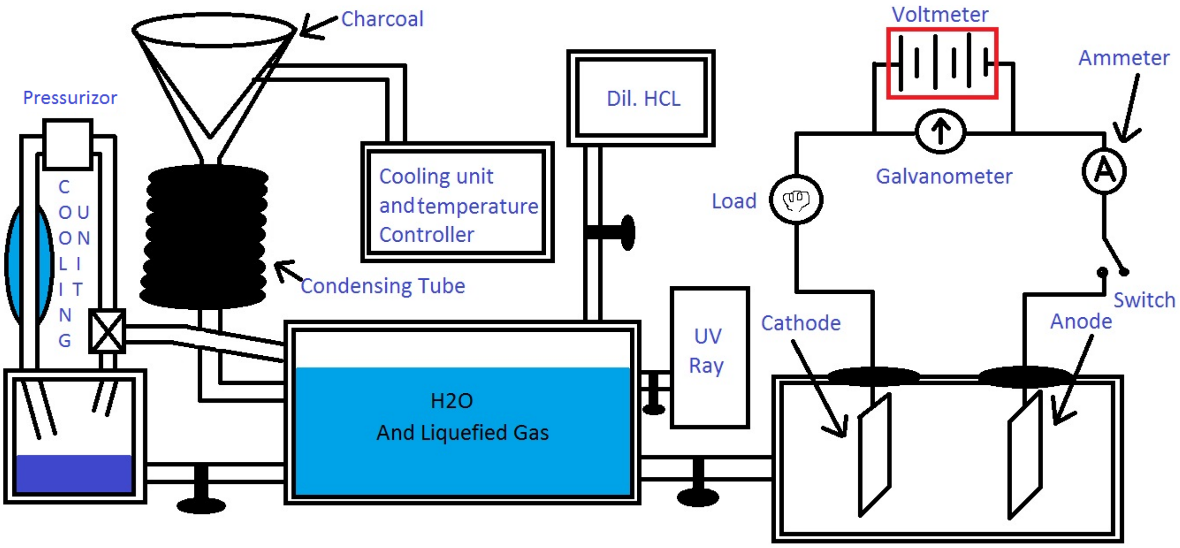


Fig 1

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