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Design a setup for easy Ethanol Inhalation

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Abstract - *Facing the present era of COVID-19 pandemic, the countries of the world must take decisive action to stop the spread of the virus. In these critical situations, it is essential that everyone is informed about other health risks and hazards so that they can stay safe and healthy. The Corona virus has impacted the global community and currently has hot spots in their first phase. There are no treatments or vaccines that are universally recognized by the medical communities. The use of alcohol, specifically, ethanol, is ubiquitous with disinfection practices in venues including healthcare facilities, such as hospitals and medical practices. It is well known that the Corona virus is killed by inhaling Alcohol. It can be an effective way to fight the virus primarily in the lungs. As a solution on that , we designed the setup for worth solving problem, how to inhale the mixture of oxygen and ethanol vapor.*

Key Words: Ethanol inhalation, oxygen, corona virus, Vaporizer, Alcohol, setup

1. INTRODUCTION

It is well known that the Corona virus is killed on contact with Alcohol. Alcohol taken by inhalation, can be an effective way to fight the virus primarily in the lungs. Alcohol for disinfection has been well established to sterilize various bacteria and disinfect viruses. Alcohols target the bacterial cell envelope, with resultant lyses of the cell and release of the cellular content. Also, it is well established that lipophilic, enveloped viruses are easier to deactivate by alcohols than the non-enveloped viruses.

COVID-19 has become a global health concern, and is causing huge economical impact due to freezing industrial activity closely linked with supply chains and blocking traffics in many countries. There is no perfect dose for covid. Most of the standard recommendations to prevent infection spread include regular hand washing, and covering mouth and nose when coughing and sneezing. Another problem is the suspected longer incubation time associated with this virus. We urgently need an additional preventative measure, which can stop, or at least slow down, the spread of this novel corona virus. If the patients required external oxygen, then we can add ethanol vapor with the oxygen.

Despite the lack of significantly elevated blood alcohol concentrations, the behavioral consequences and subjective effects associated with repeated use of devices capable of delivering alcohol vapor are required to proper inhalation. So for that We designed setup through mechanical ways which can used to aerosolize or vaporize the alcohol for easy inhalation. The setup is useful for those patients who required external oxygen.

2. Block diagram

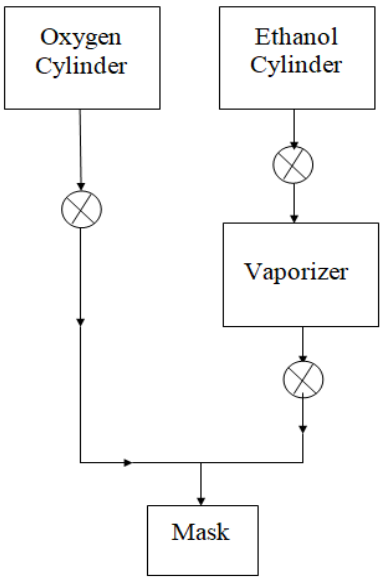

Fig -1: Block Diagram Of Setup

2.1 Working Principle

Oxygen cylinder contains Compressed oxygen which supplieds at required pressure are available at the inlet of low-pressure air and oxygen regulators built into the ventilator. The outlet pressure of these will be adjustable by using pressure regulators.

Oxygen is deliver to the aspiratory limb of the patient through solenoid valve. Opening and closing of this solenoid valve will start/stop the inspiration. Frequency of operation of solenoid valve, i.e. its ON/OFF time, is controlled by a micro-controller depending upon the requirement of respiration rate (BPM), I:E ratio and tidal volume.

There is a three-way or two-way manual control ball valves at the outlet of these two pressure regulators. Mixing of air and oxygen takes place in these valves. Required oxygen can be given to the patient using this ball valves.

oxygen being delivered to the patient are read by the controller and displayed on to an LED display. Also, the limits of these parameters can be set from the LED touch screen using touch and alarms are programmed in case the measured values cross these limits in case of any abnormality. If necessary, a non-return valve (NRV) can be provided in the aspiratory line to avoid any backflow from the patient.

During exhalation, solenoid valve in the inspiratory line will close and solenoid valve in the expiratory line will open. Hence, flow can take place from the patient through the expiratory line. If necessary, a non-return (NRV) valve can be provided in expiratory line to avoid any backflow to the patient.

The ethanol cylinder will deliver the required amount of liquid into the vaporizer, it can be controlled by using control valves. Vaporizer will deliver inhalation vapor to the mixer. Required oxygen and ethanol vapor will mixed in a mixer and fed to the patient's.

2.2 Actual Figures Of setup

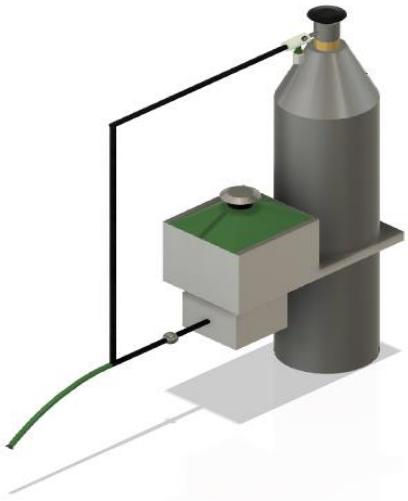

Fig -2: 3D Diagram of the setup

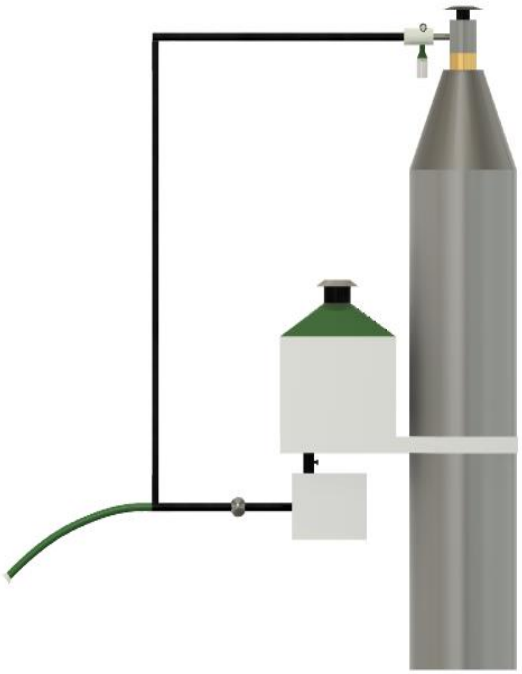

Fig -3: Front View of the setup

Fig -5: Side View of the setup

3. HARDWARE SPECIFICATIONS

3.1 Oxygen cylinder:

An oxygen tank is required for storing the oxygen, which is held under pressure in gas cylinders storage tank. Oxygen tanks are used to store gas for medical breathing gas at medical facilities and at home. Breathing oxygen is delivered from the storage tank to the users by using oxygen mask.

Fig -6: Oxygen Cylinder

Advantages:

Aluminum material cylinder is used. That's why its light in weight.

We can make as per our applications.

It is a safe.

3.2 Ethanol tank

It is used for storing ethanol in the vaporized form and dispensing ethanol to the vaporizer. For storing long time ethanol in the tank we are using E85-Compatible materials

3.3 Pressure Regulator:

A pressure regulator is a device which is used for controls the pressure of liquids or gases . They also work to maintain a constant output pressure even when there are fluctuations in the inlet pressure. Like that Oxygen regulators release compressed or liquid oxygen from an oxygen tank in a continuous mode measured in liters per minute (LPM). The oxygen regulator is adjusted by using a knob device that can adjust the flow of oxygen through the regulator.

Specifications:

Pressure(Max): 20 MPa

Materials: Anodized Aluminum, Stainless Steel

Seal Materials: Buna-N, Delrin

Operating Temperature (Min): -18 °C

Operating Temperature(Max): 60 °C

Fig -7: Pressure Regulator

3.4 3-way flow control valve:

Two-way and three-way ball valves are the most common types of ball valves. Three-way ball valves are especially

useful because they can be set up in ways that simplify the control of gas and fluid flow. Some advantages of 3-way ball valve are listed below:

It can Cut of or shut off flow
It can Switch flow between two different sources
It will Combine the flow from two different sources

Fig -8: 3-Way Flow Control Valve

Specifications:

Output pressure: 0.2 - 0.3 Mpa
Safety Valve: +0.35 to -0.05 Mpa
Flow Range: 1 - 10 Ltr/min
Materials used: Brass, aluminum alloy

3.5 Solenoid Valve:

A solenoid valve is used an electrically controlled valve. The valve contains solenoid, which is an electric coil with a movable plunger in its center. In the other position, the plunger closes to a small orifice. An electric current through the coil creates a magnetic field. The magnetic field generates an upwards force on the plunger opening to the orifice.

Fig -9: Solenoid Valve

Specifications

Valve Type : 2 Way solenoid valve
Actuator : Direct Acting
Orifice Diameter : 5.0mm
Operating Pressure: 50PSI
Port Size (OD): 3/8" OD Tube
Power: 20W

3.6 Humidifier Bottle:

Humidifier bottle is a medical instrument which is used to humidify oxygen. It can increases humidity or moisture and decrease dryness of oxygen during emergencies with oxygen supplying system. Commonly it is known as Oxygen humidifier bottle

Fig -10: Humidifier Bottle

Specifications:

Bottle Capacity: 2.5 ltr
Power Required: 30 W
Voltage: 220 V
Color: blue & white

3.7 Cannula tube:

The nasal cannula is a tube used for deliver required oxygen or increased airflow to a patient or person in need of required help. This device consists of a lightweight tube which on one end splits into two prongs which are placed in the nostrils and from which a mixture of air and oxygen flows. Material used for cannula oxygen tubing are made of Soft PVC plastic.

Fig -11: Nasal Cannula Tube

Specifications:

Materials: Polyvinyl chloride (PVC).
Size: Adult, pediatric and neonatal.
Unit : 1 oxygen cannula, medically clean, single-use, packaged in a

3.8 Vaporizer:

Vaporizer is used to convert liquid to a vapor before it becomes in the state of gaseous

The function of a vaporizer is to deliver a required amount of converted vapor to the patient in safe and reliable concentrations. It is used to controlling the vaporization liquid, and then accurately controlling the concentration in which these are added to the fresh gas flow. The design of these vaporizer depends on ambient temperature, fresh gas flow, and agent vapor pressure.

Fig -12: Vaporizer

Specifications:

Flow rate: 0.2-10,000cc/min and
temperature 10-35.
pressure tolerance. 50kPa
Liquid capacity.:120cc

3.9 Mask with tubing:

It is a Transparent Mask with Tubing used for delivering oxygen to patients. Transparent mask used for special non-toxic medical grade PVC, It contains two holes to allow carbon dioxide exhaled by the patient to out. Nasal clip for secure fixation over the patient's nose. Elastic band for placement around the head with transparent tubing to connect the mask to the oxygen pipeline. These mask are for use in hospitals and for medical use and are widely in demand.

Fig -13: Mask with Tubing

Specifications:

Volume: 6 ml or 20 ml
Length: 2 m / 2.1 m
Color: green color or white transparent
Materials: PVC, PE, and PP

5. FORMULATION:

$C_2H_5OH + O_2 = CO_2 + H_2O$

(Ethanol + Oxygen) = (Carbon dioxide + Water)

CO_2 = Carbon dioxide is an acidic colorless gas with a density about 53% higher than that of dry air. Carbon dioxide molecules consist of a carbon atom covalently double bonded to two oxygen atoms. It occurs naturally in Earth's atmosphere as a trace

H_2O = the chemical formula for water, meaning that each of its molecules contains one oxygen and two hydrogen atoms.

Inhaled air is by volume 78% nitrogen, 20.95% oxygen and small amounts of other gases including argon, carbon dioxide, neon, helium, and hydrogen. The gas exhaled is 4% to 5% by volume of carbon dioxide, about a 100 fold increase over the inhaled amount.

6. CONCLUSIONS

From the discussion, on possibility of disinfection of SARS-CoV-2 in human respiratory tract by ethanol vapor inhalation. The alcohol distillation helps to raise the ethanol concentration on the mucous membrane inside our body, where the viruses are suppose to remain and incubate. Because of nature of the lipid bilayer there is a chance to disinfect the corona virus with alcohol vapor inhalation. With the help of this setup we can give treatment for covid 19 people. We found Some disadvantages of inhalation of ethanol like Inhaling ethanol can irritate the nose and throat, causing chocking and coughing. At high levels it can cause

inebriation. Ingesting ethanol can cause mood changes, slower reaction time, uncoordinated movements, slurred speech and nausea. but we can control it by giving another respective treatment. We would like to ask researchers in this field to do more works on this method and do actual manufacturing of setup.

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