

COVID-19 Virus Repellent Solution Based on the Liquid Electric Air Sanitization

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Abstract: Indubitably the most challenging corona virus (Covid-19) outbreak, caused by SARS-CoV-2. With the number of Covid-19 cases now approaching millions globally so, for controlling the current infection rate, we have come up with this innovation of virus repellent electric liquid vaporizer means by vaporization of the solution which is the in-liquid form by means of electricity, which will enable the infectious virus and bacteria to be less effective also it will sometime kill the virus in a small room. Hydrogen peroxide is the active ingredient with virus repellent properties. A carbon-compressed wick has been designed for the homogenous release of the virus repellent composition.

Keywords: Hydrogen peroxide, virus repellent activity, Essential oil, electric vaporizer

I. INTRODUCTION

The ongoing corona virus disease (COVID-19), caused by SARS-COV-2, is probably the most daunting corona virus outbreak comparing with the past SAR-CoV and MERS-CoV outbreak. With the number of COVID-19 cases currently surpassing millions worldwide, it is obvious that (1) transmission of SARS-COV-2 is high and (2) there are significant variations in disease severity, one component which could be genetic variation in virus response. Controlling current infection rates and preventing future waves requires a deeper understanding of the routes of exposure of SARS-COV-2 and the underlying genomic vulnerability to this disease. The route of exposure that contributed to this high transmissivity was the subject of considerable discussion, in particular the role of transmission of aerosols. As with any respiratory infectious disease, an infected person can release aerosols and droplets that contain SARS-COV-2 by coughing or sneezing [1].

These aerosols (< 10µm in diameter) and droplets (>10µm in diameter) can promote the infection through (1) it gets deposited on the surface [2] and subsequently then transfer from hand to mouth/nose/eyes and (2) inhalation. Although suspended airborne droplets can last several minutes in the air, the smaller aerosols do not rapidly settle and can last for longer durations. [3]

The characteristics of aerosols generated by coughing and sneezing are complex, especially decreasing in size due to water evaporation loss depending on atmospheric humidity and temperature levels. As the size of the aerosols decreases, their ability to spread through the air is enhanced. Besides coughing and sneezing, aerosols may also be produced by normal speech and respiration.

So, to kill the virus from the air of the room we have come up with an idea of Covid-19 virus repellent solution based on liquid electric air sanitization. Which is effective to kill the virus which an individual can release in form of droplets and aerosols containing the Covid-19 virus by sneezing, coughing as well as speaking and respiration. This Covid-19 virus repellent solution based on the liquid electric air sanitization work similar to that of mosquito repellent solution based on the liquid electric.

The virus repellent solution gets vaporized with the help of the electric current with help of some chemicals and sanitizes the entire room and by which the virus will not spread in the room and others will get less affected in the room.

II. PROPOSED WORK

We have come up with an idea of an electric liquid vaporizer virus repellent which is designed to reduce the strength of the virus and to make the surface unattractive for the virus and due to this virus will not stick on the surface.

2.1 List of chemicals that can be used as a virus repellent solution: -

Active ingredients that can be used in the virus repellent solution are [4]:

1. Sodium hypochlorite
2. Ortho-phenylphenol(OPP)
3. Peroxyacetic acid
4. Pine oil
5. Quaternary ammonium chloride compounds ('Quats')
6. Caprylic acid
7. Citric acid
8. Hydrogen peroxide with stabilizer or 'accelerated hydrogen peroxide'
9. Lactic acid

2.2 The list of ingredients that is used to make the final virus repellent solution.

1. Hydrogen peroxide (4-4.5 %)
2. L-lactic acid (3-4 %) or citric acid (0.6-1 %)
3. Glycerin
4. Citronella oil
5. Eucalyptus oil
6. Neem leaves oil
7. Isopropyl alcohol(rubbing alcohol)
8. D-limonene
9. Petroleum distillate (it will help to delivered the product to the surface)(2-3ml)
10. Butylated hydroxytoluene (it helps to maintain the solution as it)(2-3ml)
11. water (solvent)

2.3 Properties of all the chemicals used in this virus repellent solution.

2.3.1 Hydrogen peroxide

Hydrogen peroxide in the presence of light is unstable and progressively decomposes. Due of this instability, hydrogen peroxide is commonly stored in a very weak acidic solution in a very dark-coloured container with a stabilizer. H_2O_2 has been predicted to have a boiling point of 150.2 °C (302.4 °F), or about 50 °C (90 °F) on top of water. It can also be distilled safely at a lower temperature and pressure.

This solution contains H_2O_2 (CAS #7722-84-1) as their only active ingredient, or contains a stabilized form of hydrogen peroxide called "Accelerated Hydrogen Peroxide (APHTM). APHTM is a "patented synergic blend" that is developed by Virox Company, which claims to "dramatically increase cleaning and germicidal potency" of H_2O_2 . The products containing APHTM usually contains a relatively low concentration of H_2O_2 as well as phosphoric acid, surfactants and other "inert" ingredients. [5-6]

In aqueous solutions, hydrogen peroxide differs from the pure substance due to the effects of the hydrogen bonding between water and hydrogen peroxide molecules.

Hydrogen peroxide and water form a eutectic combination, showing freezing point depression down to -56 °C; pure water has 0 °C freezing points and pure hydrogen peroxide has -0.43 °C, also the boiling point of the same mixture is also depressed.

It takes place at 114 °C. This boiling point is 14 °C higher than that of pure water, and 36.2 °C lower than pure hydrogen peroxide.

The solution containing hydrogen peroxide as their only active ingredient is mostly recommended because this AI is not considered as carcinogen, an asthmagen, skin sensitizer or reproductive toxin.

Health effects: Hydrogen peroxide is not listed as an asthmagen by the AOEC and the European Union does not find it as a sensitizer to the skin. Although H_2O_2 is not on the state of California Prop 65 list of a chemicals known to cause cancer, birth defects or other reproductive harm.

The American conference of governmental industrial Hygienists (ACGIH) have concluded that hydrogen peroxide is "animal carcinogen with unknown relevance to humans" [11], and the EU study has concluded that H_2O_2 is a genotoxicant and mutagenic in some of vitro experiments.

Environment: The RTU and concentrated H_2O_2 products has very few environmental warnings. Hydrogen peroxide is not toxic to aquatic species and degrades rapidly in form of oxygen and water in the environment.

Efficiency of H_2O_2 : The RTU cleaner contains around 1% hydrogen peroxide as its only active ingredient, the MSDS lists up to 1% citric acid. It has registered efficacy against 6 strains of bacteria and 5 viruses with a 10- minutes dwell time. It is also a registered fungicide with effect against the foot fungus of athletes [7].

Efficacy of AHPTM: Product containing Accelerated Hydrogen Peroxide TM tends to be an effective in killing a wider spectrum of pathogen with shorter dwelling time compare to the products containing a similar amount of unstable hydrogen peroxide.

2.3.2 D-limonene

Limonene is one of nature's most prevalent terpenes, and it may have a number of health advantages. It has been shown to possess anti-inflammatory, antioxidant, anti-stress, and possibly disease-preventing properties [8].

Limonene is a popular additive in foods, cosmetics, **cleaning products, and natural insect repellents**. Soaps, shampoos, lotions, fragrances, laundry detergents, and air fresheners are among the several items that include this compound.

Limonene has demonstrated antioxidant effects as well. Antioxidants aid in the reduction of cell damage produced by free radicals, which are unstable molecules. **Limonene may have anticancer effects.**

2.3.3 Citronella oil

Citronella essential oil is used as an insect repellent and it is found in many registered pesticide products such as sprays, lotions and candles. Citronella essential oil is also used for the treatment of insect bites, due to its antifungal properties [9].

In addition, citronella essential oil is one of the most common oils used in aromatherapy as it has an ability to treat and prevent fever and headache. Citronella oil is also commonly used in fragrance and personal care products. It is used in soaps, household cleaner and detergents, because of its antiseptic properties. Moreover, it is added as a food and beverage flavouring, such as in alcoholic drinks and frozen dairy.

2.3.4 Eucalyptus oil

Eucalyptus globulus (S. Eucalyptus) is known as the "Blue Gum" and is a medium to very tall forest trees that can reach 70 m in ideal conditions [10].

The eucalyptus essential oil is extracted by steam-distillation of eucalyptus leaves is taken orally for pain and inflammation of respiratory tract mucous membranes, asthma, bronchitis and coughs.

It is also serving as an antiseptic, insect repellent and treatment option for wounds.

Eucalyptus oil is also commonly used in perfume and cosmetics as a fragrance, and is also used in mouthwashes, toothpastes and cough drops.

2.3.5 Isopropanol [11]

Table I. Isopropanol properties

IUPAC name	propan-2-ol
Chemical safety	Flammable, irritant
Molecular formula	C_3H_8O
Molecular weight	60.1 g/mol
Color/form	Colorless liquid
Odor	1. Pleasant odor
Boiling point	82.3 °C at 760 mm Hg
Melting point	-89.5 °C
Flash point	53 °F
Solubility	Miscible with alcohol, ether, chloroform; Very soluble in benzene. In water, infinitely soluble at 25 °C
Density	0.78509 at 25 °C
Vapor pressure	45.4mm Hg at 25 °C

2.3.6 Petroleum Distillate [12]

Table II. Petroleum Distillate property

Molecular weight	99 g/mol
Color/form	Dark yellow to brown or green-black liquid
Odor	Mild gasoline or kerosene like
Boiling point	30 to 238 °C
Freezing point	-73 °C
Flash point	-40 °C to -66 °C
Solubility	insoluble
Vapor pressure	40 mm at 20 °C

2.3.7 Butylated hydroxytoluene (BHT) [13]

Table III. Butylated hydroxyl property

Molecular weight	99 g/mol
IUPAC name	2,6-Bis(1,1-dimethylethyl)-4-methylphenol
Color/form	White semitransparent solid
Odor	Slightly phenolic odor
Boiling point	265 °C
Freezing point	69 - 73 °C
Flash point	127 °C
Solubility	Insoluble

2.3.8 Glycerin [14]

Table IV. Glycerine properties

IUPAC name	propane-1,2,3-triol
Chemical safety	Flammable, irritant
Molecular formula	$C_3H_8O_3$
Molecular weight	92.09 g/mol
Color/form	Clear, colorless syrupy liquid
Odor	Odorless
Boiling point	290 °C (decomposes)
Melting point	18.2 °C
Flash point	177 °C
Solubility	Miscible with ethanol; slightly soluble in ethyl ether; insoluble in benzene, Solubility in water: miscible

2.4 How this solution will work on the virus?

We have come up with an idea of an electric liquid vaporizer virus repellent it is designed to reduce the strength of virus and to make the surface unattractive for the virus so due to this virus will not stick on the surface. They typically contain an active ingredient hydrogen peroxide that repels the virus. Which enables the harmful virus and bacteria to be removed from indoor spaces owing to the vaporization of some chemicals in liquid form by means of electricity.

We'll require a good formulation with the correct Vapour pressure, density, and viscosity. This is achieved by mixing the right proportion of isoparaffins along with required

quantity of active ingredient like Hydrogen peroxide, Accelerated hydrogen peroxide, Citric acid, and Lactic acid. The composition according to the invention comprises a combination of one active ingredient which has the virus and bacteria repellent property and also or more than one herbal oil with synergistic property.

Within the scope of the initiative, hydrogen peroxide featuring the repellent property is employed as the active ingredient. The anthraquinone method is used to make hydrogen peroxide. The vaporizer composition according to the invention comprises the individual components or combinations selected from the group consisting of L-lactic acid, citric acid, Glycerine, Citronella oil, Eucalyptus oil, Neem leaves oil, Isopropyl alcohol, D-limonene, Petroleum distillate, Butylated hydroxytoluene, water.

Repellent composition which is preferred above requires a special wick that provides a homogenous release for each material of this composition due to their different vapor pressures.

Generally, wicks materials that are used in the electric vaporizer application systems are compressed carbon, compressed saw dust and polymers or bamboo fibres and cotton for the release of mixtures for the homogeneous vaporization of virus repellent mixture with electric vaporizer.

The volatile components in the vaporizer mixture evaporate comparatively quickly than the less volatile ones due to the selective permeability of the wick materials mentioned above, and around half of the composition left unreleased in the bottles. According to studies it is determined that wick materials which are made of different contents of cotton and bamboo fibres provide more linear release compared to the known wicks.

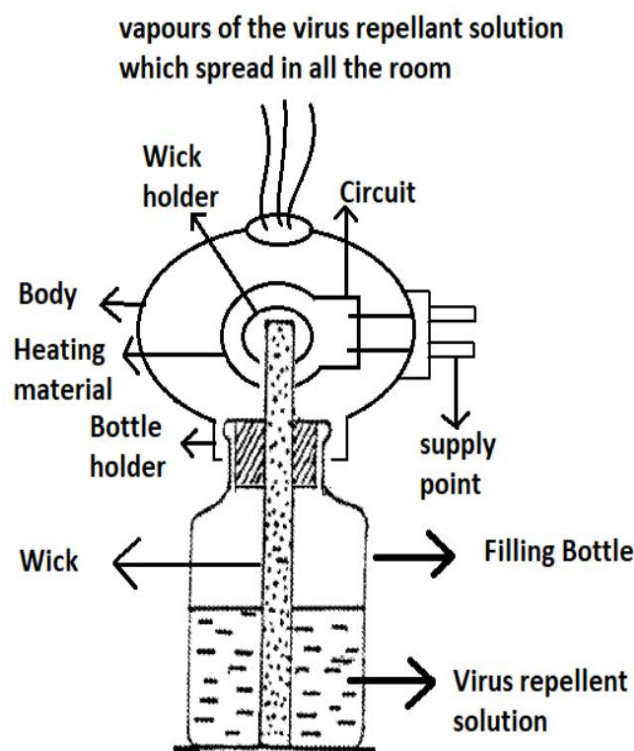


Fig. 1 Wick-Bottle Position

A Pet bottle with a plug and a clay carbon wick is used to fill the mixture. The clay carbon wick is the system's most significant component. It should have right porosity to allow liquid to rise by capillary action. The basic mechanism of working of the refill depends on the right temperature by exposing the wick to 10–15 mm of the heater. What is important is to give almost 130-150 °C temperature to this wet wick area.

In a liquid vaporizer, the wick that is made of porcelain has two ends with one end dipped in liquid and the other attached with the electrical coil on top. When the current passes it heats the wick that warms the liquid and converts it into vapour. This vapour spreads in the room and prevents virus from coming into the room and also not to stick on the surface. These vaporisers are meant for use in small rooms. For effective functioning it requires the use of the optimum formulation, wick, and temperature.

This invention will account for the worldwide domestic type virus repellent use and it will be the first 100% virus repellent product ever developed in the electric liquid vaporizer. The product does not cause any health issue even when used continuously during the day, wherein said product exhibits the repellent action on the bacteria and fungi also. As a result, the invention provides a product, which is safe in terms of human health and which has strong repellent action on the virus, bacteria and fungi.

III. RESULTS

1. This innovation is very helpful to the organization as it reduces the transmission due spreading of virus in the air.
2. This virus repellent solution work on electric vaporizer machine which will be less costly than other products and it is easy to use and efficient.
3. The ingredients that are used in the virus repellent solution are not at all harmful to any human being.
4. Our product is used to reduce the strength and make the covid-19 virus ineffective. The Vapour of solution will cover the virus from all the side and make it ineffective. So, the transmission of virus from one person to another will take place at very slow pace or negligible in that room.

IV. CONCLUSION

So, this innovation of Covid virus repellent solution based on the liquid electric air sanitization. This virus repellent solution gets vaporised with the help of the electricity and sanitize the entire room and prevent the virus to stick on the surface for longer time and kill the virus or make it less effective which an individual can release in form of droplets and aerosols that containing covid virus by any means like sneezing, coughing as well as speaking and respiration.

This product does not cause any health issues even when it is used continuously during the day, wherein this product exhibits the repellent action on the bacteria and fungi also. By the different labs test report, we can conclude that how much this product is efficient to control the transmission. This product will account for the worldwide domestic type virus repellent use and it will be the first virus repellent product ever developed in electric liquid vaporizer also it can be afforded by any person.

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