

EFFECTIVE DRUG DISTRIBUTION TECHNIQUE FOR ASTHMA

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Abstract: Asthma is one of the leading Disease of the major Developed & Non-Developed countries, and in which asthma and COPD (Chronic Obstructive Pulmonary Disease) one of the major world dead full diseases over a frequency of 235million (2015) listed by the WHO. And the treatment for the diseases is by Antiasthmatic drugs. The way of administering the drug may effective through oral by Inhalers and Nebuliser's. In which this article deals with the supply of medication through the "Vaping Technique" in which the procedure is Theoretically Described in the article by the device named as the "IndSar – 15K".

Keywords: Asthma, Vaping Technique, Indsar – 15K.

1. INTRODUCTION

Asthma, COPD (Chronic Obstructive Pulmonary Disease) is a type of the obstructive lung disease occurs due to the tobacco smoking and also by Environmental factors but it may lead to shortness of breath, and a progressive disease development. In which treatment for the disease is by Antiasthmatic drugs, which induces the relaxation of smooth muscles of bronchi and alveoli and causes dilation of the bronchi and alveoli smooth muscles, the mode of administration differ by oral in which by the Inhalers and Nebuliser's. In which on the article the "IndSar – 15K" is described theoretically in a precise manner.

2. METHODOLOGY

The methodology employed here is the Vaping Technique, that by the "IndSar – 15K" device, the device is same as like the vaping mechine (e-cigarette).

IndSar – 15K

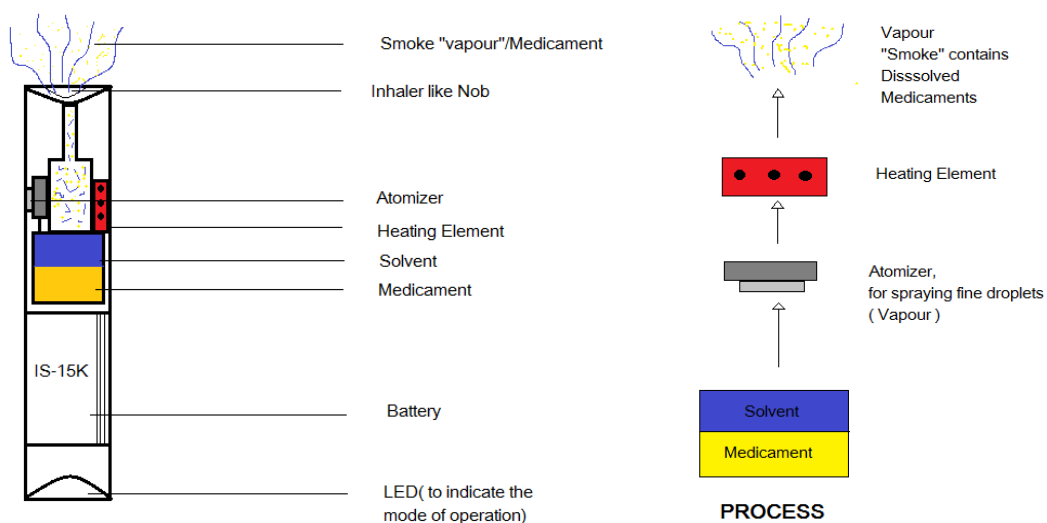


fig : 1.1

fig : 1.2

Already Available Equipment's:**INHALER****fig : 1.3****NEBULIZER****fig : 1.4**

In the IndSar-15K employed here is effective safe and easy to carry it's portable and handy. While the inhaler it requires a special tutorial and some experience to inhale the medicament, and also in the nebulizer required trained people only handle and administer. To overcome the shortages the Indsar-15K is designed to portable and handy. The following picture's fig: 1.5 & 1.6 describes the space required for nebulisation in the hospitals, and also intake of medicament through the inhaler.

**fig : 1.5****fig : 1.6**

i. "IndSar-15K"

The mechanism behind the equipment is same as like the e-cigarette and technique of vaping is employed for the treatment of asthma, while the person feels suffocation, readily puff this few second the medication delivered through the smoke, and the efflux of the lungs may start and the blood vessels dilated due to medication and further turn to the normal life, expected with less duration of seconds than the inhalers and the nebulisers, while the patient starts inhale from the top the sensor activates the process and the mode of operation begins with the ignition of the heating element by the source of battery, then the cubical space left for the vaporization is then sprayed by the atomizer with the medicament and the suitable solvent for vaporization, in which the solvent has a less boiling point then the medication, and the solvent like Propylene Glycol (Glycerine) is employed in which the vapour pressure of the solvent is dynamic so the "temperature controlled heating elements" are preferred in the module to attain the specific heat requirement, vaporization of the solvent followed by the spraying of the medicament (albuterol). In which the cubical zone inside the chamber cartilage is obeys the "Kinetic theory of Gases" in which the sub-microscopic particles encircles along the cubical space as like Brownian moment. While at the top is fitted with a fine pours Semipermeable membrane in which while a person inhale with minute pressure the momentum along the moment of the vapour phase will flow along a definite direction through the mouth to the lungs, as then the medication suspend on the alveoli of the lungs. Then efflux of the lungs starts, the blood vessels dilate and the person may feel the relaxation within few second of inhalation.

ii. Components of the “Indsar-15K”:

Battery

The battery employed to this “IndSar – 15K” is a “lithium ion battery” of a capacity of about 1100mah – 2500mah Battery and is rechargeable. In which is eco-friendly battery of option, and recyclable.



“Lithium Ion Battery”

The required amount of the energy for the process can be calculated by the formula employed here as,

$$\Delta T = \Delta Q / C$$

Here;

ΔT – Change in Temperature

ΔQ – Net Added Energy

C – Heat capacity

Heating Element and Atomizer

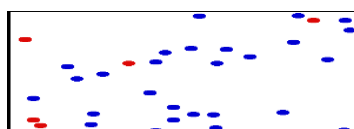
The heating element and the atomizer are prefixed. And is mainly intent for the delivering of the required amount of the output as fixed and regulated atomizers are preferred in the “IndSar – 15K”. In which a resistor of 10W is preferred to produce of about 250°C, “*Small resistor can attain a high temperature*”



The heating element and the Atomizer are selected to the required regulatory procedure by the WHO on the construction of the (ENDS- Electronic Nicotine Delivery System)

The Cubical Surface for Solvent and Medicament Zone

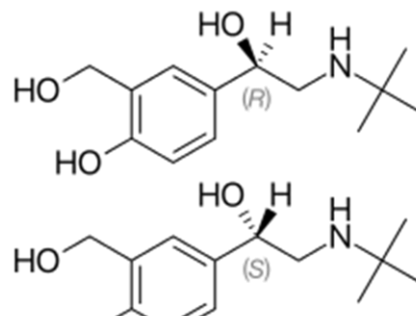
The cubical area for the vaporization is already disclosed by the principle of “kinetic theory of Gases”. The theory describes that the “kinetic theory of gases” describes a gas as a large number of submicroscopic particles (atoms or molecules), all of which are in constant, rapid, random motion. The randomness arises from the particles' many collisions with each other and with the walls of the container. In which the atomization of the solvent and the medicament will begin after the medium of the cubical chamber attains the suitable temperature of about approximately 188.5°C.



The force exerted on the cubical zone is resisted at the top with a semipermeable membrane in which a mouth piece, the movement of the particles in the vapour inside the chamber of the cubical surface is dynamic and while a person inhales the vapour, definite momentum (Magnitude and Direction) attained to the vapour then it passes through the oral route by the inhalation mechanism, mouth to the lungs.

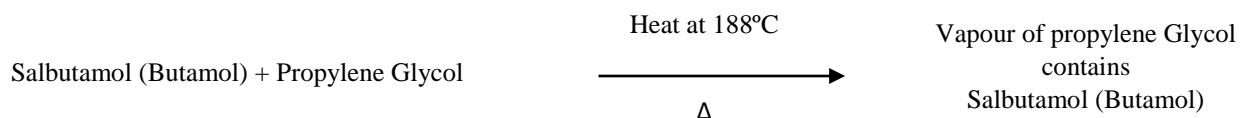
Pharmacological Activity:

Salbutamol is a short-acting, selective beta2-adrenergic receptor agonist used in the treatment of asthma and COPD. It is 29 times more selective for beta2 receptors than beta1 receptors giving it higher specificity for pulmonary beta receptors versus beta1-adrenergic receptors located in the heart. Salbutamol is formulated as a racemic mixture of the R- and S-isomers. The R-isomer has 150 times greater affinity for the beta2-receptor than the S-isomer and the S-isomer has been associated with toxicity. This led to the development of levalbuterol, the single R-isomer of salbutamol. However, the high cost of levalbuterol compared to salbutamol has deterred wide-spread use of this enantiomerically pure version of the drug. Salbutamol is generally used for acute episodes of bronchospasm caused by bronchial asthma, chronic bronchitis and other chronic bronchopulmonary disorders such as chronic obstructive pulmonary disorder (COPD). It is also used prophylactically for exercise-induced asthma.

*Salbutamol Structure***Theoretical Description**

In which here the theoretical description of the mechanism of IndSar-15K is that, a vaping technique to which the concept of delivering the medicament through vape, such that nicotine is already had been delivered by this technique by Chinese pharmacist *Hon Lik*. Of all overcome from this research is that “*Even Nicotine is able to deliver by vape, Why can't the medicament for asthma?*” that this research has propagated with the suitable available information,

Salbutamol is also available as liquid dosage form for the Nebulizer, in which while the solution is turned to vape, by employing the vapour producing solvent of which is mostly nontoxic to the humans. So that vegetable Glycerine such as propylene Glycol is a suitable solvent as used in E-liquid for ENDS. In which the Glycol will have a vapour pressure of about 50°C. If salbutamol (Medicament) is spared over the vapour of the propylene glycol the vapour now attains as treatment vapour it contains the active ingredient such as that of required for the treatment of asthma. The temperature required for the solvent to evaporate is 150°C – 188.5°C. in which salbutamol can attain its degradation limit by thermal over the 204°C onwards. So it's still active in the temperature of vapour and it's suitable for to prepare the combination.



During the reaction the heat required is accompanied by the heat regulated temperature controlled heating element and the propylene glycol is a nontoxic vapour, and also the use of the propylene glycol is effective and safe listed as a 95% effective by the WHO^[iv] and also by the Public Health of England.

3. DISCUSSION**1. Why to use IndSar – 15K?**

IndSar – 15K is a machine works in the mechanism as like the vaping technique, in which on the Inhalers and Nebuliser's the medicament is administered through the oral route. Active medicament of the drug is directly absorbed by the lungs alveoli and the bio availability of the drug is faster. In IndSar – 15K the vaping technique to which the medicament is mixed with the suitable vapour. It may converted to smoke,

1. Smoke induces the lungs to enlarge.
2. Smoke reduces the particle size to a microscopic scale thereby increasing the absorption of its active chemical principles.

To which the reduced particle sized medicament is inhaled by the individual is directly enters the lungs, react are bind easily with the alveoli branch segments, then the drug bind with the blood and the action of the drug takes place. Smoke enters faster than the inhalation of medicament by the other route.

Pro's & Cons:

1. It's Effective and faster Response because *"The lesser the particle size of the product the greater will be the absorption."*
2. Delivering through the Inhalation route will induce faster drug blood contact.
3. Patient time to recovery from the Suffocation is lesser.
4. Easy to administer.
5. Onset of action is faster.

Cons:

1. The Propylene Glycol used for the vape will induces minute irritation along the respiratory track on first time.
2. It's Addictive.
3. Avoid during Gestation period.
4. Regulated Child use is adequate.

Apart from that the theoretical behaviour of the system is analysed by the available data's. While it's practical orientation only promotes it to the further level of progress. By analysing the AAS (Atomic Absorption Spectroscopic) values of the output vapour contains how much percentage (%) of the medicament and a case study is also required to predict the analysed data.

4. RESULT

According to this "IndSar-15K" is described Theoretically, but its application is estimated by practical demonstration and careful visualization and data recording by the atomic absorption spectroscopy that amount of vapour exhausted from the device contains the active ingredients is measured, and the theoretical data satisfied the requirements. But practical progress of orientation will fulfils the Queries of the device.

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