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Associated Hazard of Air Freshener with Raw Materials

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Abstract

The word Air Freshener is a substance used in controlling odor and wide unpleasant smells especially those in the environment. It is related to the Latin word perfumery (to fill with smoke), (Golden, 2003). Air fresheners are pervasive within indoor built environments, such as workplaces, schools, housing, transportation, hotels, hospitals, care facilities, and a range of private and public buildings. Air fresheners are designed to impart an aroma to the air environment or to mask odors, with the intent of creating a pleasing indoor space. Also to provide an alternative source of raw materials for the production of Air fresheners. Air fresheners also include so-called air care, deodorizer, odor control and neutralizer products. In addition to site-specific units or portable products, air fresheners can include scented air systems, which deliver fragrance throughout a space, such as by connecting a fragrance diffuser to the heating, ventilation, and air conditioning system. In conclusion, air fresheners are used throughout society, often with the intent to create a favorable indoor air environment. However, air fresheners may come with unintended and perhaps invisible risks. This article looked at the science, health, and policy dimensions of air fresheners, and offered research findings and directions on ways to improve the air quality indoors and reduce potential exposures to pollutants.

Keyword: *Air fresheners, Fragrance, Odor, Raw, Material, Pollutants.*

INTRODUCTION

The word Air Freshener is a substance used in controlling odor and wide unpleasant smells especially those in the environment. It is related to the Latin word perfumery (to fill with smoke), (Golden, 2003). Air fresheners are pervasive within indoor built environments, such as workplaces, schools, housing, transportation, hotels, hospitals, care facilities, and a range of private and public buildings. Air fresheners are designed to impart an aroma to the air environment or to mask odors, with the intent of creating a pleasing indoor space. However, despite the intent, air fresheners can emit and generate a range of potentially hazardous air pollutants that can impair air quality. Even so-called green and organic air fresheners can emit hazardous air pollutants. Air freshener ingredients are largely unknown and undisclosed, owing to regulatory protections on consumer product ingredients and on fragrance formulations. In studies, fewer than ten percent of all volatile ingredients are typically disclosed on air freshener labels or material safety data sheets. From an indoor air quality perspective, air fresheners have been indicated as a primary source of volatile organic compounds within buildings.

Air Freshener was first developed by John Jayeo in 1817, which it was declared that resin soap could be dissolved to a clear solution in tar oils or creosote to form a black refreshing fluid. Later on in 1987, Damman a German scientist presented a method for preparing Lysol a disinfectant which follows in the category of air freshener containing a high proportion of phenols in soap solution which gave on dilution a clear solution in distilled water. From a health perspective, air fresheners have been associated with adverse effects, such as migraine headaches, asthma attacks, mucosal symptoms, infant illness, and breathing difficulties. This article investigates the seeming paradox that products designed to improve the indoor environment can pose unintended and unknown risks. It examines the science, health, and policy

perspectives, and provides recommendations and research directions.

Air Freshener is as result of heterogeneous mixture of different chemical substance, which retains a portion of the odorless principle, which can be blended by a vehicle, solvent and fixatives, (Steinman, 2001).

AIM

This work is aimed at developing an economic and indigenous way of producing Air freshener using local plant materials in the best interest of small-scale industries thereby conserving the foreign exchange earnings. Also to provide an alternative source of raw materials for the production of Air fresheners.

SCOPE OF STUDY

This study centers on the production of Air fresheners from natural plant materials. Air fresheners are consumer products that emit a fragrance to provide an aroma to a space, to mask an odor, or both. Air fresheners come in numerous versions, including sprays, gels, oils, liquids, solids, plug-ins, hanging disks, beads, potpourri, wick diffusers, and scented candles; in active or passive forms; and with instant, intermittent, or continuous release.

STATEMENT OF PROBLEM

In Nigeria over ninety percent of the Air fresheners in use are imported either as finished or semi-finished product. Air fresheners also include so-called air care, deodorizer, odor control and neutralizer products. In addition to site-specific units or portable products, air fresheners can include scented air systems, which deliver fragrance throughout a space, such as by connecting a fragrance diffuser to the heating, ventilation, and air conditioning system. In this paper, air fresheners are considered as products designed to impart an aromatic fragrance or a masking fragrance into the air; they are not considered to include air cleaning devices designed to filter or purify the air. Even the locally produced air fresheners are still based on synthetic raw materials.

Due to the various use of Air freshener in the country, the need arises for its production from local plant materials in order to reduce the cost of buying from abroad and subsequent importation into the country.

JUSTIFICATION OF THE STUDY

This work is designed towards providing an alternative source of raw materials for the production of Air fresheners. This will aid in minimizing if not stopping entirely the present importation syndrome which does not only constitute a severe drain on our economy but has also turn our country into fertile dumping ground for both low quality and out dated Air fresheners. It will also create job opportunity for the producers in the country.

LIMITATION OF THE STUDY

This work is limited to the use of natural plant materials for the study.

This work is also limited due to unavailability of finance to move to many places where the materials needed are located.

REVIEW

According to George 1977 air freshener may define as mixture of pleasant odorous substance incorporated in a suitable vehicle. The modern vehicle for holding perfume for manufacturing of air refresher is highly refined ethyl alcohol (ethanol) mixed with more or less water according to the solubility of the oil employed.

The manufacture of perfume and air fresheners collecting known as the fragrance has undergone drastic change in the past quarter century prior to which perfumes were usually trained through apprenticeship in laboratories until working with traditional materials in well defined patterns. They achieve skill in mixing and blending (Dorland and Rogers 1977).

Define air fresheners: The term Air freshener was first used by Pringles in 1950 to describe substance that prevents awful smell or odor from the environment. The idea was eventually applied to the treatment of odor from Pringles arenas. However, it was not until the nineteenth century that air refresher came into general use. The corner- stone of modern air refresher was laid at the end of last century.

It was observed that the early incense produced were merely a mixtures of finely grounded spices held together by myrrh. The next step made was viewing from the fact that certain spices and flowers were steeped in fat or oil. This could tend to retain a portion of the odorless principle (Blot and Wells 1981).

In the laboratory experiment performed by Avicenna year, a British physician in his research for medical portions he discovered steam distillation of volatile oil. He found that flowers boils in combination with water gave up some of their essence to the distillate. Hence the quest for sweet smelling substance (Air freshener) was born and maintains its ageless quality sweet smelling fragrance (Othmer, 1966).

In the pursuit of that Air freshener that perfume emerge which tends to have way for air refresher. Only occasionally has a new and original odor been developed such as old spice, which immediately won spontaneous and favorable response from customers. Not many person realize how complete the creation of an acceptable fragrance has become it require professional knowledge, skill and experience, coupled with specialization in synthetic

chemistry technical problems followed by consumer panel testing, (Worall, 1974).

CHEMISTY OF AIR FRESHENERS

Air freshener is purely from a class of organic compounds known as esters. They are commonly found in nature. Esters are responsible for the fragrance of flowers and the flavour of fruits. Because of this fragrance, they are used in the manufacture of air fresheners and the flavours of many of them are utilized in the manufacture of sweets and soft drinks. Esters are responsible for the aroma of orange, banana, apple, pineapple, and pear etc. (Alexandra, 1962).

Table

FORMULA	IUPAC NAME	COMMON NAME
$HCOOCH_3$	Methyl methanoate	Methyl acetate
CH_3COOCH_3	Methyl ethanoate	Ethyl acetate
$CH_3COOCH_2CH_3$	Ethyl ethanoate	Propyl formate
$CH_3CH_2COOCH_2CH_3$	Ethyl propanoate	Propyl acetate
$CH_3COOCH_2CH_2CH_3$	Propyl methanoate	
$CH_3CH_2COOCH_2CH_2CH_3$	Propyl ethanoate	

PREPARATION OF ESTER

A general method of preparing ester is by heating an alcohol with a carbonic acid in the presence of a strong mineral acid such as concentrated tetraoxosulphate (vi) acid as a catalyst. (Taylor, 1962).

CHEMICAL REACTIONS OF ESTERS

HYDROLYSIS: Esters can undergo both acid and alkaline hydrolysis.

Acid hydrolysis of esters is the reverse of esterification.

AROMA OF ESTERS

Esters have very pleasant odor (aroma). The aromas of many flowers are due to the presence of esters. Esters are used in the manufacture of perfumes. Air freshener used in toilets and as flavoring agents in the manufacture of sweets and soft drinks. However, vapors of esters could be toxic of inhaled in very large quantities. (Egbuluka, 1984).

COMPOUNDS USED AS AIR FRESHENER

The following compounds are used as Air fresheners: (Whyte, 1987).

1. Ferrous sulphate
2. Calcium chloride
3. Potassium permanganate
4. Zinc chloride

Coal and wood tars as well as various substances capable of absorbing unpleasant-smelling gases, such as wood charcoal and peat. (Francis, 1991).

In many cases ozone is added to the air (using forced ventilation) in order to remove undesirable odors. Air freshener (ozonizers) as charged with liquid containing pines and essential oils. (Ezhi, 1990).

CHARACTERISTICS OF AN IDEAL AIR FRESHENER

1. **HOMOGENEITY:** Air freshener should be homogeneous in composition. Many of the commercial air freshener particularly those from coal may vary considerably in their composition from time to time and consequently in their refreshing value.
2. **SOLUBILITY:** The air freshener is one which will dissolve in all proportion in water.
3. **NON-TOXICITY TO HIGHER LIFE**: An air freshener is non poisonous to man and other higher animal.
4. **ECONOMY:** The air freshener should be low in cost, cost must not be judged by volume but by power. One air freshener may cost more per gallon than another yet it may have twice the protracting power since certain an effective chemical is very expensive. They can be used only in limited quantities and for special purpose.
5. **DEODORIZING POWER:** An air freshener, which can combine with air and destroy substances, is preferable to one, which does not provide of course. It does not have a disagreeable odor.
6. **PENETRATING POWER:** Air freshener which combines its deodorizing power with penetrating power is of adverse important to others.

CAUSES OF ODOUR

Odor has been defined as unpleasant smelling gaseous substances that are formed as a result of the purification of organic substrate (human and animal wastes foodstuffs corpses). They are caused by air- borne molecules of certain substances. (Rebecca, 1982).

1. **BACTERIA:** Which are found in manure are responsible for creating odorous gases as they breakdown organic materials. (Wovalton 1998).
2. **TEMPERATURE:** This controls the rate of bacterial action. The higher the temperature the faster biological action and therefore the greater the gas production. This explains the fact that fewer odors are produced in cold weather condition. (Ken Justices, 2002).
3. **MOISTURE:** This is required for biological activity to take place. The bacterial activity slows and can be stopped as manure is died. Moisture also makes anaerobic conditions more likely in the manure and thereby encourages the activity of odor causing anaerobic bacteria. (Watskin, 2002).

PRINCIPLE OF EFFECTIVE ODOUR CONTROL METHODS

The most common and effective odour control method are based or the following three principles:

1. Reducing the formation of odour causing gases
2. Reducing the release of odorous gases into the atmosphere and
3. Dispersing the odourous gases as quickly as possible once they have been released.

HOW AIR FRESHER WORKS

An air fresher is a product which contains germicides to prevent the bacteriological breakdown of sweat into unpleasant smelling substances. Air freshener and anti perspirant are two distinct products that differ in their action. Though there is a tendency for the two terms to be confused and to refer to all products as Air fresheners. (Caress, 2009).

An anti-perspirant is a product that reduces the sweating rate. Most anti perspirant contains germicides and therefore has Air freshener properties. Air fresheners destroys contracts, masks conceals or eliminate unpleasant smelling/odours that are formed as a result of the purification of organic substrates (human and animal wastes, foodstuffs corpses, sewage etc), (Rebecca, 1996).

Air refresher works in various ways

1. Many household fresheners works by masking (concealing) an unpleasant odour with a strong, pleasant odour. These Air fresheners often contain perfumed alcohol or some other substance that is evaporated or sprayed into the air. Some neutralize odors by chemically changing odor-producing molecules that have no odour. (Evans, 2000).
2. Some air fresheners work by removing odour producing gases and other impurities from the air. In one type called a scrubber, the air passes through a liquid that dissolves the impurities. In another type, the air passes through a filter of charcoal or other porous materials; the molecules of the impurities are absorbed by the material that is they are drawn into the materials surface. (Katty, 1987).
3. Other air freshers work by destroying the source of unpleasant odor. The freshers include disinfectants and antiseptics.

   A disinfectant can breakdown organic matter into substances with unpleasant odor. An antiseptic stop the growths of these organisms, other ways various air freshers work are as follows:

WAYS THE CONSTITUENTS USED IN MANUFACTURING AIR FRESHENER WORKS

A. Carbons can absorb offensive odors from the air.
B. Glycols when sprayed or dispersed in the atmosphere as aerosols can dissolve odoriferous molecules. (Eric Sam 2001).
C. Formalin vapor can counteract many odors by combining with them to form substances that are less noticeable. (Otus Clement 1970).
D. Chlorine can also overcome certain unpleasant smells in part through its capacity to act as an oxidizing agent. (Obobo Robinson 2000).
E. Essential oil. Perfumes and such disinfectants as carbolic acid simply mask the odor making it less offensive. (Hazil Northstone 2003).

FACTORS AFFECTING THE ACTIVITIES OF AIR FRESHNER

The most important factors affecting air refresher activities are

1. **CONCENTRATION:** The higher the concentration of Air freshener the greater will be the rate of diffusion. This is particularly important with the phenolic groups of compound whose activity full of very rapidly with dilution. (Louis, 1987).
2. **TIME AND TEMPERATURE:** In general air refresher activity is increased with time and a sufficient exposure is important for effective deodorization. (Justice, 2002).

3. **ORGANIC MATTER:** Most air refresher is reduced on activity by the presence of organic and particularly by the presence of protein such as those of fluids. (Katty, 2002).

USES OF FRESHNERS

Air freshener is used extensively in toilet, hospitals, restaurants, factories, homes and many other places to hide unpleasant smells. It is also used to refresh room atmosphere. (Eric sam, 2001).

METHODOLOGY

RAW MATERIALS

1. Lemon grass.
2. Leaves of citrus sinensis (grape).
3. Seed of avocado pear.

REAGENTS

Propylene glycol
Mineral oil
Benzyl acetate
Amyl alcohol
Sodium benzoate
Sodium larel sulphate
Ethanol
Acetone
Water
Colorant
Ambipour

EQUIPMEMT

Steam distillatory
Bucket
Weighing
Pulverizes
Beaker
Measuring cylinder
Hydrometer
Thermometer

1.1 PROCEDURE

Natural materials was crush to be distillated and was mix with water so as to bring out the content very well. Then was put into the flask A of the distillatory. Then apparatus was assembled. Steam was passed into flask A which was heated by means of a flame to prevent two rapid accumulations of water. When the substance crystallizes in the condenser and tends to choke it, water was applied out of the condenser a few minutes until solid materials melts. Then the steam now carried the materials into the recover. The water was finally readmitted to the hot condenser.

The passage of steam is continued until no appreciable amount of material was detected in the distillate. The distillation is discontinued by the supply of steam and the source of heat was removed from flask A.

Thermometer was used to detect the temperature of the boiling liquid.

SOLVENT EXTRACTION PROCESS

The following raw materials were used, lemongrass, avocado pear.

The raw material was bought from Rumuokoro market Port Harcourt, dried with sunlight for some days, then pulverized (put into powder) using pulverizes. The essence of pulverizing was to create more surface area for extraction. 2kg of each pulverized materials was weighed out. All was put into mineral oil and propylene glycol and was shaken very well for proper mixing. The propylene glycol help to bring out the perfumed fragrance in the materials while mineral oil help to hold the fragrance since it is by cryophilic and the essential oil also hydrophilic. The system was heated for 10-15minutes at the temperature of 45^0c. It is heated, covered to avoid evaporation of the essential oil. It was kept for 24hours. This is to enhance proper extraction. Then it was filtered with clean white cloth to filter off the weak materials in the solution.

Acetone + alcohol was mixed with filtrate. Enhance further extraction of the aromatic oil inherent in those raw materials afore mentioned. This was kept for 24hours. Then it was treated with benzyl acetate and amyl alcohol. After which the solution was filtered again to get the essential oil. (Filtered).

A. SOLUBILITY IN WATER

Water and solubility was closely observed. Some portion was also added to organic solvent (ethanol) and the solubility was also observed.

B. SMELL

This was carried out by perceiving the fragrance exhaled by the sample and judgment passed out passed on individual perception.

C. COLOR

This was determined by observation. A small quantity of the sample was poured into a transparent conical flask. The color displayed by the solution was noted.

D. SPECIFIC GRAVITY

The apparatus used was a measuring cylinder and hydrometer. Successive portion of the sample was poured into the measuring cylinder and the hydrometer was dipped into the solution and reading was taken.

RESULT

According to the tests that was carried out the following results was obtained.

A smell

It has a very good smell.

SOLUBILITY IN WATER

It is sparingly soluble in water but soluble in organic solvent such as ethanol.

COLOR OBSERVATION

It is Brown in color.

DISCUSSION

Most Air freshener that are sold in the market today consists of several perfume/ fragrance ingredients. The essential oils that is odoriferous which is used as a perfume/fragrance in the production of air freshener are mainly insoluble in water but soluble in organic solvent. (Hazil Northstone 2003).

As a matter of fact in the production of air freshener, the production usually starts with a base that will contribute the main note.

The producer hence ensures thorough mixing of the materials and stirs the mixture to ensure homogeneity.

Table Result of Analysis.

Smell	Pleasant
Solubility in water	Soluble
Colour	Brown in colour

OBSERVATION

1. It was observed that as hours/ days passes by the perfume/fragrance in the raw materials used i.e. lemon grass, citrus sinensis and avocado seed comes out gradually i.e. it is prone to ages.
2. It was observed that the air freshener made from natural materials is not toxic to higher animals also gives a good aroma.
3. It does not cause any allergic manifestation.
   The solvent extraction method gives more yield of the extract than the distillation method.

CONCLUSIONS

In conclusion, air fresheners are used throughout society, often with the intent to create a favorable indoor air environment. However, air fresheners may come with unintended and perhaps invisible risks. This article looked at the science, health, and policy dimensions of air fresheners, and offered research findings and directions on ways to improve the air quality indoors and reduce potential exposures to pollutants. Natural raw materials like lemongrass, rose flower, grape flowers gives a very nice aromatic perfume in the production of Air freshener. Its use should be encouraged in the country so as to enhance our natural raw materials and also minimize importation into the country.

The result of the production of air freshener shows that for a higher yield, the right raw material and adequate solvent should be used and proper mixing must be done.

RECOMMENDATION

PERFECTION OF THE SOLVENT EXTRACTION METHOD

Solvent extraction method is both an effective and efficient method and means of extraction of perfume from the natural raw material used in the production of air freshener. With the fact that odoriferous oils are not soluble water but only in organic solvents. Cheaper to operate compare to any other process or means.

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