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(54) TOBACCO PACKAGING HAVING A CONTROLLED INTERNAL ENVIRONMENT

TABAKVERPACKUNG MIT EINER GESTEUERTEN INTERNEN UMGEBUNG

EMBALLAGE DE TABAC AYANT UN ENVIRONNEMENT INTERNE CONTRÔLÉ

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Description

Field of the Invention

[0001] The present invention relates to a package containing a tobacco product or tobacco material having a controlled internal environment which prevents deterioration of the packaged product.

Background to the Invention

[0002] Snus is a heat-treated moist powder tobacco product that is typically consumed by placing it under the upper lip for extended periods of time. There are various types of snus available on the market. Loose snus is a moist powder which can be portioned and shaped prior to insertion into the mouth. Portion snus is pre-packaged in small sachets of porous non-woven material.

[0003] The freshness of the snus product, which can be considered to mean 'having the properties of the newly made product', is determined by seven key parameters: flavour character (i.e. taste and aroma); flavour impact or strength; flavour balance (i.e. the subtle character); pH level; moisture level; nicotine level and appearance.

[0004] Tobacco products and tobacco materials such as snus absorb oxygen and emit carbon dioxide. The complete mechanisms of this gas exchange are not fully understood, but are thought to include chemical reactions such as oxidation of, for example, unsaturated fatty acids naturally occurring in tobacco.

[0005] The almost universally adopted retail packaging format for snus is a moulded, shallow, drum-shaped, lidded container, often made from plastics such as polypropylene. Other packaging formats include the use of metal or waxed cardboard or a combination such as metal lid and cardboard can. The majority of these containers are readily gas permeable, and allow unhindered gas exchange between the internal environment of the package and the external environment. A consequence of the low barrier properties of the packaging which allow unhindered gas exchange to the external environment is the loss and deterioration in moisture content, flavour and pH, reducing the perceived quality of the product and thereby limiting the shelf-life of the packaged product. Figure 1 depicts the theoretical changes which occur in the snus product packaged according to the current packaging system.

[0006] Changes in snus product quality parameters and flavour components over shelf life have been examined in various studies and it has been found that a large decline in moisture, water activity, pH, nicotine and flavour volatiles occur throughout shelf-life. Sensory evaluation of snus suggests that it develops undesirable 'off aromas' over time, the components responsible for this may occur as a consequence of oxidative processes.

[0007] Gaseous movement can be prevented by the use of an airtight sealed pack, resulting in the snus product being packaged in a sealed environment. Whilst this approach prevents volatile loss and can therefore preserve desired product moisture and flavour, this approach is problematic because once the sealed product has consumed all available oxygen and the internal pack environment becomes oxygen-free there is a rapid deterioration in sensory quality of the snus product. In particular, the snus product produces an offensive odour when no oxygen is present (termed "zero-oxygen off"). Furthermore, the internal gas balance within the pack is disrupted when the level of carbon dioxide, which is produced by the snus product and trapped within the sealed packaging, increases significantly beyond normal atmospheric concentrations. Such evolution of gas within the fixed volume of a sealed pack can physically stress the packaging materials and seals resulting in loss of pack integrity or even rupture. Figure 2 represents the theoretical changes that occur in snus packaged in absolute barrier modified atmosphere packaging (MAP) (i.e. oxygen-limited).

[0008] In order to overcome these problems, snus has been packaged in sealed packs with high oxygen content. As described in EP2048976 and US20080029116, smokeless tobacco products, such as snus, can be sealed in outer packaging materials that are virtually impervious to oxygen and/or moisture, and those packaging materials can be vacuum sealed or sealed such that the atmosphere there within is fixed at the time of packaging but not actively controlled thereafter. Alternatively, the controlled gaseous environment in the package may comprise oxygen in an amount greater than about 25%, to a maximum of about 80%.

[0009] However, the use of "high" oxygen is not an optimal solution because at elevated oxygen levels undesirable oxidative processes are accelerated and high amounts of available oxygen increases the rate of oxygen consumption and carbon dioxide evolution by tobacco products such as snus. This consumption of oxygen and evolution of carbon dioxide results in depletion of oxygen within the package and oxidative deterioration, and the consequential sensory changes related to use of oxygen, occur more quickly. Furthermore, high levels of oxygen can contribute to the deterioration of pH of the tobacco product. Figure 3 represents the theoretical changes in snus in absolute barrier packaging with internal elevated oxygen content.

[0010] As such, there is a need for improved packaging for snus, which enables the internal gaseous environment to be controlled in order to prevent deterioration of the packaged product and increase the shelf-life. Figure 4 depicts the ideal situation wherein the flavour, moisture content and pH of the snus product are maintained at consistent levels over time, thereby increasing the perceived quality and freshness of the product, and extending the shelf-life.

Summary of the Invention

[0011] The first aspect of the present invention provides a packaging system according to claim 1 comprising a sealed or re-sealable package containing a tobacco product, wherein the internal environment within the package is actively controlled to maintain a pre-determined gaseous composition.

[0012] The oxygen level is preferably maintained above zero percent and below atmospheric oxygen levels, in order to slow undesirable changes to the product resulting from oxidative processes.

[0013] The sealed or re-sealable package prevents unwanted loss of moisture content and flavour of the tobacco product, whilst maintaining the oxygen concentration in the package above zero prevents the rapid deterioration in the sensory quality of the tobacco product associated with a zero oxygen environment, thereby extending the shelf-life of the product.

[0014] The second aspect of the invention relates to the use of an oxygen-releasing insert comprising sodium percarbonate but no drying agent contained within a sealed wrapper fabricated from a material or combination of materials providing oxygen and water vapour transmission capabilities in the packaging system according to the first aspect of the invention.

Description of the Drawings

[0015]

Figure 1 depicts the theoretical changes which occur in snus packaged according to the current packaging system;
Figure 2 represents the theoretical changes that occur in snus packaged in absolute barrier packaging;
Figure 3 represents the theoretical changes in snus in absolute barrier packaging with internal elevated oxygen content;
Figure 4 represents an ideal situation wherein the flavour, moisture content and pH of the snus product are maintained at consistent levels over time.
Figure 5 illustrates the results for changes in the moisture content of the test sample versus the control sample over time;
Figure 6 illustrates the results for changes in the pH of the test sample versus the control sample over time;
Figure 7 illustrates the results for changes in the flavour of the test sample versus the control sample over time. The results were determined by measuring (A) limonene, (B) linalool, (C) linalyl acetate and (D) citronellol levels;
Figure 8 illustrates the results for changes in the pack oxygen composition of the test sample versus the control sample over time;
Figure 9 illustrates the results for changes in the pack carbon dioxide composition of the test sample versus the control sample over time; and
Figure 10 shows the oxygen analysis for each oxygen-releasing insert test sample.

Detailed Description of the Invention

[0016] The present invention provides a packaging system comprising a sealed or re-sealable package containing a tobacco product or material that is designed to create and maintain an actively controlled internal environment having a stable pre-determined gaseous composition that is maintained within a pre-determined range. The combination of a sealed pack and prevention of a zero-oxygen pack atmosphere prevents the deterioration of moisture, flavour and other sensory attributes of the tobacco product. This packaging system results in the product remaining fresher for longer, thereby maintaining the product quality and increasing the shelf-life.

[0017] The tobacco product or tobacco material may be selected from raw tobacco, processed tobacco, cigarettes, cigars, snus, American snuff, formed tobacco-based oral products, nasal snuff, pipe tobacco, "roll your own" (RYO) tobacco, and "make your own" (MYO) tobacco.

[0018] In a preferred embodiment, the tobacco product is snus. As used herein, the term "snus" refers to moist powder tobacco product that is consumed by placing it under the upper lip.

[0019] The term "sealed package" refers to a gas-impermeable container having a hermetic closure. The term "re-sealable package" refers to a gas-impermeable container wherein the seal can be restored following an opening or closure event. Sealed and re-sealable packages provide an absolute barrier enabling the moisture content and flavour of the tobacco product to be retained over time. The sealed or re-sealable package may, for example, be a retail package in which the tobacco is sold to the end-user or a shipping container in which raw or processed tobacco products and/or materials are transported in bulk.

[0020] According to the system of the invention, the oxygen level within the package is actively maintained above zero and below 21% (atmospheric oxygen). As discussed above, it is highly undesirable for the oxygen level within the

package to fall to zero, however increasing the oxygen level significantly above zero is also damaging to the tobacco product, as the rate of oxidation, and associated oxidative damage to the product, increases with the percentage oxygen content. By maintaining a sub-atmospheric oxygen level undesirable oxidative processes are decelerated, yet by maintaining the oxygen level at greater than 0% alternate undesirable sensory effects, such as bad odour emission are prevented. Therefore, it is preferable for the oxygen level within the package to be actively maintained as close to zero as possible. Preferably, the oxygen level is maintained within a range of greater than 0% to 5%, more preferably within a range of greater than 0% to 2%, and most preferably at a level of 0.1%.

[0021] According to the invention, the packaging system further comprises means, referred to herein as 'active controlling elements', for evolving oxygen into the internal environment within the package at a controlled rate in order to enable the oxygen level to be actively maintained within the ranges described above.

[0022] The controlling elements emit oxygen at a rate which is equal to or slightly greater than the rate at which oxygen is consumed by the tobacco product, in order to maintain pack oxygen levels greater than, but preferably close to, 0%. The rate at which oxygen is emitted by the controlling element should compensate for the rate of oxygen consumption by the tobacco product. The rate of consumption by the product, and hence the rate of emission by the controlling element, depends primarily on the mass and moisture content of tobacco product within the package, and the storage temperature. To a lesser extent, oxygen consumption is also dependent on the tobacco type, the presence of additives and processing of the tobacco product or material.

[0023] Preferably, the control element supplies oxygen to the internal environment within the package at a rate of 0.1-500 μl/g/day, more preferably at a rate of 1-250 μl/g/day, and most preferably at a rate of 2-105 μl/g/day. Oxygen is provided to the internal environment within the packaging continuously, in order to prevent oxygen depletion, and slowly, in order to suppress the rate of oxidative changes and the resultant negative effects on pH and sensory attributes of the product.

[0024] Optionally, the controlling element also absorbs carbon dioxide produced by the tobacco product or material from the internal environment within the package in order to actively maintain the internal volume of the package. Preferably, evolved carbon dioxide is absorbed by the controlling element at a rate of between 0.1-50 μl/g/day, and preferably at a rate of 2-15 μl/g/day.

[0025] The rate of oxygen emission and carbon dioxide absorption by the control element at different temperatures and % moisture content levels is exemplified for snus in Tables 1 and 2, however the rate of gas exchange has also been measured in a variety of other tobacco single grades, components and finished products. When the moisture content of the snus product is approximately 50% w/w the preferred rate of oxygen emission and carbon dioxide absorption by the control element at various storage temperatures (5°C, 25°C and 35°C) is shown in Table 1.

Table 1

Storage temperature (°C)	O_2 (μL/g/day)	CO_2 (μL/g/day)
5	2-5	2-5
25	10-20	5-15
35	65-80	5-15

[0026] When the moisture content of the snus product is approximately 25% w/w the preferred rate of oxygen emission and carbon dioxide absorption by the control element at various storage temperatures (5°C, 25°C and 35°C) is shown in Table 2.

Table 2

Storage temperature (°C)	O_2 (μL/g/day)	CO_2 (μL/g/day)
5	5-10	2-10
25	10-20	5-15
35	95-105	5-15

[0027] The rate of oxygen emission and carbon dioxide absorption by the control element at 25°c and 20-23% moisture is exemplified for RYO tobacco in Table 3.

Table 3

Storage temperature (°C)	O_2 (μL/g/day)	CO_2 (μL/g/day)
25	5-10	5-10

[0028] In addition to the above data for snus, it has been found that at ambient temperatures of ~25°C, single grades of tobacco (leaf & stem) require 0.18 to 2.28 μl/O_2/g/day and produce 0.00 to 1.06 μl/ CO_2/g/day. Blend components (e.g. Cut Rolled Extanded Stem (CRES), tobacco Sheet, Dry Ice Expanded Tobacco (DIET)) of smoked tobacco products have been found to require 0.19 to 1.16 μl/O_2/g/day and produce 0.01 to 0.77 μl/CO_2/g/day. Manufactured tobacco products require 0.84 to 9.78 μl/O_2/g/day and produce 0.29 to 6.55 μl/CO_2/g/day.

[0029] The controlling elements can include any means capable of evolving oxygen. Suitable means may be in the form of a chemical composition contained within sachets comprising a semi-permeable membrane (termed "active inserts" or "oxygen-releasing inserts") which are placed within the sealed or re-sealable package; a chemical composition contained within layers of a multi-laminate foil pack and connected to the inside of the package by micro-perforations; a chemical composition held in a separate part of the package and connected to the inside of the package by a channel; a chemical composition held between inner and out parts of a two-component package; a chemical composition held within a label adhered to the inner surface of the package; or a chemical composition contained within the fabric of a plastic package and connected to the inside of the package by channels within the solid walls of the package. Preferably, the controlling means is in the form of an active insert.

[0030] Oxygen-producing and, optionally, carbon dioxide-absorbing inserts suitable for inclusion in food packages and tobacco packages are described in GB 2450860 and are commercially available under the brand name OxyFresh™ from EMCO Packaging Systems.

[0031] Preferred inserts suitable for use to achieve the internal gaseous environment within the sealed or re-sealable tobacco package as required by the present invention preferably comprise a wrapper fabricated from a material or combination of materials (i.e. a composite material) having gas and water vapour transmission capabilities. The wrapper may comprise a permeable membrane or a combination of impermeable and permeable membranes. The insert wrapper design enables the correct amount of moisture uptake (required to promote degradation of oxygen-releasing compounds within the insert), oxygen release to the internal environment of the package and, optionally, carbon dioxide absorption from the internal environment of the package.

[0032] The wrapper helps to control the stability of the oxidant by restricting moisture availability, and hence slowing the release-rate of oxygen. The specific properties of the wrapper will depend to some extent on the nature of the packaged product. However, the wrapper should provide a good moisture barrier to protect the oxidant from water, but a relatively poor oxygen barrier to allow transmission of oxygen into the pack headspace. A preferred wrapper is made from material having overall high oxygen transmission rates and low water vapour transmission rates. This may be achieved using a single material or a composite of two or more different materials. A high oxygen transmission rate (OTR) is defined herein as 100 cm^3/m^2/24hr or higher, measured at atmospheric pressure of 1 atm and in accordance with the ASTM D3985 standard. A low water vapour transmission rate (WVTR) is defined herein as 5.0 g/m^2/24hr or lower, measured at atmospheric pressure of 1 atm and in accordance with the ASTM F1249 standard.

[0033] An example of a material that acts as a complete barrier to oxygen and water vapour is a foil, such as a polyethylene terephthalate/aluminium/ polyethylene (PET/alu/PE) trilaminate foil.

[0034] Examples of materials that permit overall high rates of oxygen transmission but low rates of water vapour transmission are breathable film, oriented polypropylene/polyethylene (OPP/PE) bilaminate plastic, nylon 11, high-density polyethylene (HDPE), polystyrene (PS), polypropylene (PP), polycarbonate (PC), low-density polyethylene (LDPE) and ethylene-vinyl acetate (EVA). Using a combination of the foil and the more permeable materials allows a balance of properties suitable for this application. A preferred wrapper is a composite of foil and OPP/PE bilaminate plastic.

[0035] A preferred oxygen-releasing insert suitable for use to achieve the internal gaseous environment within the sealed or re-sealable tobacco package as required by the present invention comprises sodium carbonate peroxyhydrate (also known as sodium percarbonate) as the oxygen-releasing agent.

[0036] The active insert may also contain a drying agent such as Bentonite clay or a zeolite, which have a very large capacity to absorb water in the form of water vapour from the atmosphere. However, the present inventors have surprisingly found that the action of a drying agent is counter-productive in oxygen-releasing inserts and the best performing inserts do not contain a drying agent. This is contrary to the teachings of the prior art and can be shown experimentally. It is believed that drying agents may not be specific enough to trap only water; they may also promote removal of hydrogen peroxide from the sodium carbonate-hydrogen peroxide adduct (sodium percarbonate). Once the peroxide is free it will rapidly decompose to water and oxygen. Therefore, the presence of a drying agent causes an increase in the oxygen level within the package, to above desirable levels. As such it is preferred that the insert included in the packaging system of the invention does not contain any drying agents. Preferably, sodium percarbonate is the only component within the

oxygen-releasing insert.

[0037] Therefore, a further embodiment of the present invention relates to the use of an oxygen-releasing insert that contains sodium percarbonate and does not contain a drying agent in the packaging system of the invention. The sodium percarbonate oxygen-releasing agent is preferably contained within a sealed wrapper having the oxygen and water vapour transmission properties described above.

[0038] The present invention will now be further described by the following nonlimiting examples.

Example 1

[0039] A sample of LD Red™ snus was obtained from stock and the standard pack quantity was packed into absolute barrier packs containing oxygen-generating inserts. A second sample, which was used as the 'control', was packaged in the manufacturer's standard 2-piece polypropylene can with side label. A third sample, which was used as the 'gas control' for the analysis of gas composition, was packed into absolute barrier packs without containing the oxygen-generating inserts.

[0040] All samples were stored at ambient conditions and key measures associated with freshness including: moisture; pH; flavour; gas content; and sensory analysis were measured at irregular intervals over a total period of 32 weeks. The 'gas control' was used as an addition in sensory analysis.

[0041] The results for moisture content and pH are illustrated in Figures 5 and 6, respectively. The results for flavour, determined by measuring limonene, linalool, linalyl acetate and citronellol levels, are illustrated in Figure 7(A-D), respectively. The results for gas composition are illustrated in Figure 8 (pack oxygen composition) and Figure 9 (pack carbon dioxide composition). The results of the sensory comparison experiments at week 0 and week 32 are summarised in Tables 4a and 4b respectively. In each table the number or word underlined indicates the result achieved by each element in the comparative study.

Table 4a

WEEK 0	**COMPARED TO Fresh sample of LD snus**						**Zero oxygen "OFF" AROMA?**	
	Much less fresh	Less fresh	As fresh	Fresher	Much fresher			
CONTROL	1	2	3	4	5		yes	no
GAS CONTROL	1	2	3	4	5		yes	no
SAMPLE	1	2	3	4	5		yes	no

Table 4b

WEEK 32	**COMPARED TO Fresh sample of LD snus**						**Zero oxygen "OFF" AROMA?**	
	Much less fresh	Less fresh	As fresh	Fresher	Much fresher			
CONTROL	1	2	3	4	5		yes	no
GAS CONTROL	1	2	3	4	5		yes	no
SAMPLE	1	2	3	4	5		yes	no

[0042] The overall results of the study are summarised in Table 5 below.

Table 5

	Percentage lost		**Percentage retained**				**Oxygen in pack**	**Sensory**
	Moisture	**pH**	**Limonene**	**Linalool**	**Linalyl acetate**	**Citronellol**		
Control	5.06	14.63	17.3	59.5	47.9	48.3	-	NOT FRESH
Sample	0.42	6.02	55	77.9	64.8	62.1	YES	FRESH

(continued)

	Percentage lost		Percentage retained				Oxygen in pack	Sensory
	Moisture	pH	Limonene	Linalool	Linalyl acetate	Citronellol		
Gas Control			-	-	-	-	NO	NOT FRESH

[0043] As detailed in Table 5, the actively-supported oxygen packaging sample retained more moisture and flavour than the control and, unlike the gas control, had oxygen continuously present within the package, which prevented oxygen-depletion and the product developing the very negative (zero oxygen "off") sensory profile. Furthermore, the actively-supported oxygen packaging sample had better pH and sensory stability than the control, due to the slower/lower internal pack oxygen availability than the control; this suppressed the rate of these oxidative changes.

[0044] As such, it can be concluded that the actively-supported oxygen packaging system provides a significant shelf-life improvement for snus.

Example 2

[0045] Inserts were prepared for testing as detailed in Table 6 below.

Table 6

Sample	Insert wrapper	Oxygen-releasing agent	Drying agent
1	OPP/PE	Sodium percarbonate (1 g)	None
2	Foil / breathable film	Sodium percarbonate (1 g)	None
3	Foil / breathable film	Sodium percarbonate (1 g)	Silica gel (1 g)
4	None	None	None

[0046] The inserts were based on two combinations of three different wrapper materials. The foil material is a PET/alu/PE trilaminate which acts as a complete barrier. The OPP/PE bilaminate has an OTR of 834 $cm^3/m^2/24h$ (measured according to the ASTM D3985 standard) and a WVTR of 3.5 $g/m^2/24h$ (measured according to the ASTM F1249 standard). Both OTR and WVTR are measured at atmospheric pressure. The breathable film is also a low gas barrier/high moisture barrier material. Using a combination of the foil and the more permeable materials allows a balance of properties suitable for this application.

[0047] Silica gel was chosen as the drying agent and was purchased in a format of 1-3 mm particle size with a colour indicator (red indicates material is active, yellow indicates inactive). The ingredients were mixed and put into the wrapper materials which were then closed by heat-sealing.

Sample preparation & analysis

[0048] Metalised trilaminate material was used to make bags approximately 15cm x 20cm in size. 24 pouches of factory-produced LD Red snus was placed into each foil bag together with one oxygen-releasing insert of each type. Several samples of each variation were made, and the bags were heat-sealed to create an airtight closure. One set of samples (Sample 4) was made containing no inserts to act as a control. All the samples were stored at 22 °C. Samples were periodically tested for gas composition using a PBI Dansensor gas analyser.

Results & discussion

[0049] Oxygen analysis is shown in Figure 10. The coding reference is as shown in Table 6.

[0050] Test samples 3 and 4 reached 0% oxygen after approximately 7 weeks. However, the other two test samples 1 and 2, which contain sodium percarbonate as the oxygen-releasing agent but no drying agent, held the oxygen level within the target range of 0-20 % for the duration of the testing period (approximately 90 days).

[0051] There is a clear difference between the rate of oxygen release in the presence or absence of a drying agent. The best performing inserts did not contain a drying agent.

Claims

1. A packaging system comprising a sealed or re-sealable package containing a tobacco product, wherein the internal environment within the package is actively controlled to maintain a pre-determined gaseous composition, wherein the system comprises an active insert for emitting oxygen into the internal environment within the package at a controlled rate, and wherein the active insert comprises sodium percarbonate contained within a sealed wrapper fabricated from a composite material having gas and water vapour transmission capabilities.

2. A packaging system according to claim 1, wherein the oxygen level is maintained within a range of greater than 0% to 21%.

3. A packaging system according to claim 2, wherein the oxygen level is maintained within a range of greater than 0% to 5%.

4. A packaging system according to claim 3, wherein the oxygen level is maintained within a range of greater than 0% to 2%.

5. A packaging system according to claim 3, wherein the oxygen level is maintained at 0.1%.

6. A packaging system according to any of claims 1 to 5, wherein the insert does not comprise a drying agent.

7. A packaging system according to any of claims 1 to 6, consisting of sodium percarbonate contained within the wrapper.

8. A packaging system according to any of claims 1 to 7, wherein the rate at which oxygen is emitted from said means varies according to the storage temperature and /or the required moisture content of the tobacco product.

9. A packaging system according to any of claims 1 to 8, wherein oxygen is emitted from said means at a rate of between 0.1-500 μl/g/day.

10. A packaging system according to any of claim 1 to 9, wherein the means for emitting oxygen also absorbs evolved carbon dioxide at a controlled rate.

11. A packaging system according to claim 10, wherein the rate at which carbon dioxide is absorbed by said means varies according to the storage temperature and /or the required moisture content of the tobacco product.

12. A packaging system according to claim 10 or claim 11, wherein carbon dioxide is absorbed by said means at a rate of between 0.1-50 μl/g/day.

13. A packaging system according to any preceding claim, wherein the tobacco product is snus.

14. Use of an oxygen-releasing insert that contains sodium percarbonate and does not contain a drying agent in a packaging system as defined in any of the preceding claims.

Patentansprüche

1. Verpackungssystem, das eine versiegelte oder wieder versiegelbare Verpackung umfasst, die ein Tabakprodukt enthält, wobei die interne Umgebung innerhalb der Verpackung aktiv gesteuert wird, um eine vorbestimmte gasförmige Zusammensetzung aufrechtzuerhalten, wobei das System einen aktiven Einsatz zum Emittieren von Sauerstoff in die interne Umgebung innerhalb der Verpackung mit einer gesteuerten Rate umfasst, und wobei der aktive Einsatz Natriumpercarbonat umfasst, das innerhalb einer versiegelten Hülle enthalten ist, die aus einem Verbundmaterial gefertigt ist, welche Gas- und Wasserdampfübertragungsfähigkeiten aufweist.

2. Verpackungssystem gemäß Anspruch 1, wobei der Sauerstoffpegel innerhalb eines Bereichs größer als 0 % bis 21 % gehalten wird.

3. Verpackungssystem gemäß Anspruch 2, wobei der Sauerstoffpegel innerhalb eines Bereichs größer als 0 % bis 5 % gehalten wird.

4. Verpackungssystem gemäß Anspruch 3, wobei der Sauerstoffpegel innerhalb eines Bereichs größer als 0 % bis 2 % gehalten wird.

5. Verpackungssystem gemäß Anspruch 3, wobei der Sauerstoffpegel bei 0,1 % gehalten wird.

6. Verpackungssystem gemäß einem der Ansprüche 1 bis 5, wobei der Einsatz kein Trocknungsmittel umfasst.

7. Verpackungssystem gemäß einem der Ansprüche 1 bis 6, bestehend aus Natriumpercarbonat , das in der Hülle enthalten ist.

8. Verpackungssystem gemäß einem der Ansprüche 1 bis 7, wobei die Rate, mit der Sauerstoff von dem Mittel emittiert wird, gemäß der Lagertemperatur und/oder dem erforderlichen Feuchtigkeitsgehalt des Tabakprodukts variiert.

9. Verpackungssystem gemäß einem der Ansprüche 1 bis 8, wobei Sauerstoff aus dem Mittel mit einer Rate zwischen 0,1-500 µl/g/Tag emittiert wird.

10. Verpackungssystem gemäß einem der Ansprüche 1 bis 9, wobei das Mittel zum Emittieren von Sauerstoff auch entstehendes Kohlendioxid mit einer gesteuerten Rate absorbiert.

11. Verpackungssystem gemäß Anspruch 10, wobei die Rate, mit der Kohlendioxid von dem Mittel absorbiert wird wird, gemäß der Lagertemperatur und/oder dem erforderlichen Feuchtigkeitsgehalt des Tabakprodukts variiert.

12. Verpackungssystem gemäß Anspruch 10 oder Anspruch 11, wobei Kohlendioxid von dem Mittel mit einer Rate zwischen 0,1-50 µl/g/Tag absorbiert wird.

13. Verpackungssystem gemäß einem vorgehenden Anspruch, wobei das Tabakprodukt Mundtabak ist.

14. Verwendung eines Sauerstoff freisetzenden Einsatzes, der Natriumpercarbonat enthält und kein Trocknungsmittel enthält, in einem Verpackungssystem gemäß einem der vorhergehenden Ansprüche.

Revendications

1. Système de conditionnement comprenant un conditionnement fermé hermétiquement ou pouvant être refermé hermétiquement contenant un produit de tabac, dans lequel l'environnement interne à l'intérieur du conditionnement est contrôlé activement de façon à maintenir une composition gazeuse prédéterminée, ce système comprenant un insert actif pour émettre de l'oxygène dans l'environnement interne à l'intérieur du conditionnement à un débit contrôlé, et dans lequel cet insert actif comprend du percarbonate de sodium contenu à l'intérieur d'un emballage fermé hermétiquement fabriqué à partir d'un matériau composite ayant des capacités de transmission de gaz et de vapeur d'eau.

2. Système de conditionnement selon la revendication 1, dans lequel le niveau d'oxygène est maintenu dans les limites d'une plage de plus que 0 % à 21 %.

3. Système de conditionnement selon la revendication 2, dans lequel le niveau d'oxygène est maintenu dans les limites d'une plage de plus que 0 % à 5 %.

4. Système de conditionnement selon la revendication 3, dans lequel le niveau d'oxygène est maintenu dans les limites d'une plage de plus que 0 % à 2 %.

5. Système de conditionnement selon la revendication 3, dans lequel le niveau d'oxygène est maintenu à 0,1 %.

6. Système de conditionnement selon l'une quelconque des revendications 1 à 5, dans lequel l'insert ne comprend pas d'agent dessicatif.

7. Système de conditionnement selon l'une quelconque des revendications 1 à 6, consistant en du percarbonate de sodium contenu à l'intérieur de l'emballage.

8. Système de conditionnement selon l'une quelconque des revendications 1 à 7, dans lequel le débit auquel de l'oxygène est émis dudit moyen varie selon la température de stockage et/ou le taux d'humidité requis du produit de tabac.

9. Système de conditionnement selon l'une quelconque des revendications 1 à 8, dans lequel de l'oxygène est émis dudit moyen à un débit situé entre 0,1 et 500 μl/g/jour.

10. Système de conditionnement selon l'une quelconque des revendications 1 à 9, dans lequel le moyen pour émettre de l'oxygène absorbe aussi le dioxyde de carbone émis à un débit contrôlé.

11. Système de conditionnement selon la revendication 10, dans lequel le débit auquel le dioxyde de carbone est absorbé par ledit moyen varie selon la température de stockage et/ou le taux d'humidité requis du produit de tabac.

12. Système de conditionnement selon la revendication 10 ou la revendication 11, dans lequel le dioxyde de carbone est absorbé par ledit moyen à un débit situé entre 0,1 et 50 μl/g/jour.

13. Système de conditionnement selon l'une quelconque des revendications précédentes, dans lequel le produit de tabac est du tabac à priser humide.

14. Utilisation d'un insert dégageant de l'oxygène qui contient du percarbonate de sodium et ne contient pas d'agent dessicatif dans un système de conditionnement selon l'une quelconque des revendications précédentes.

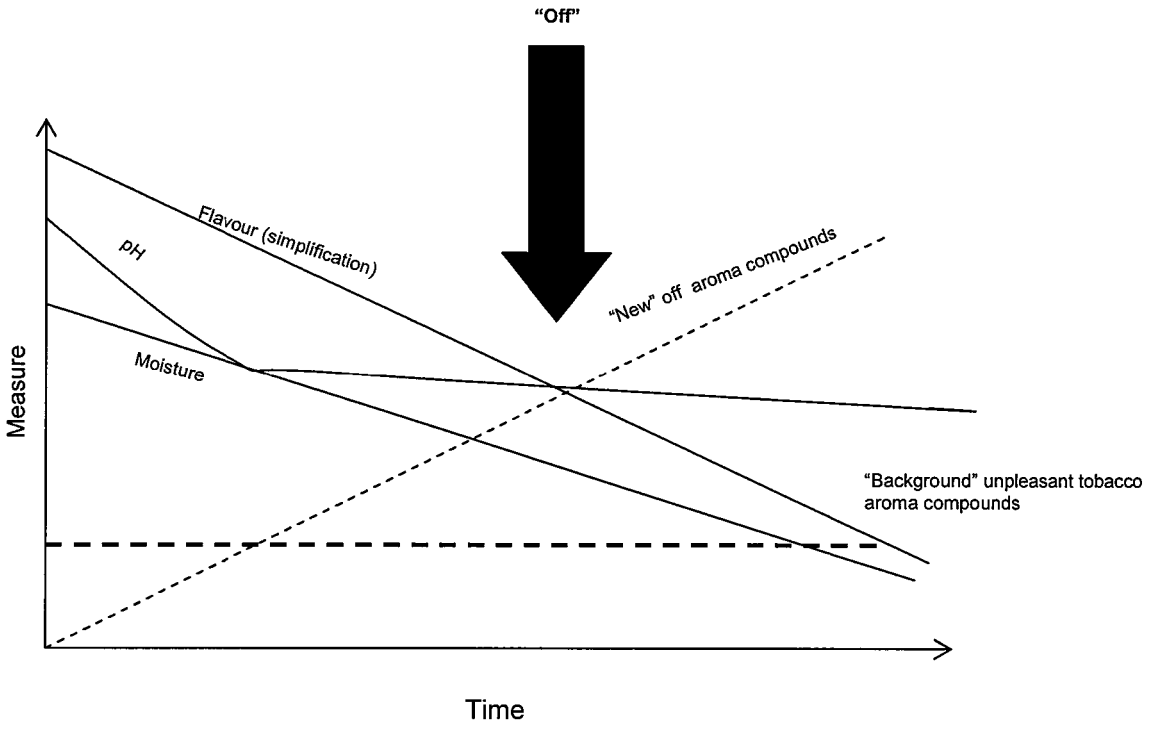


FIGURE 1

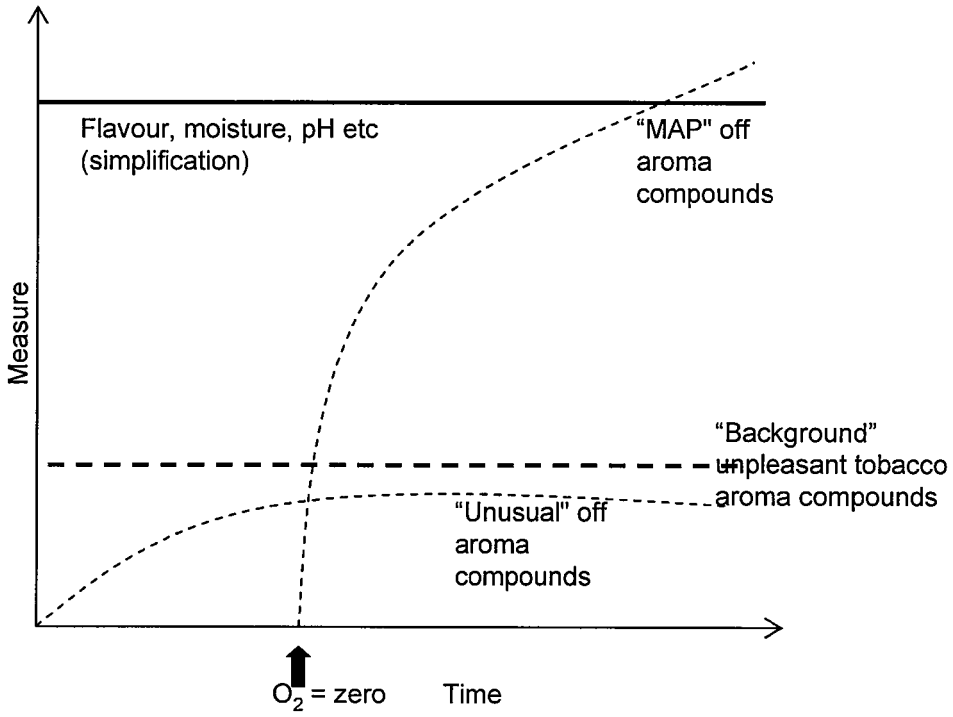


FIGURE 2

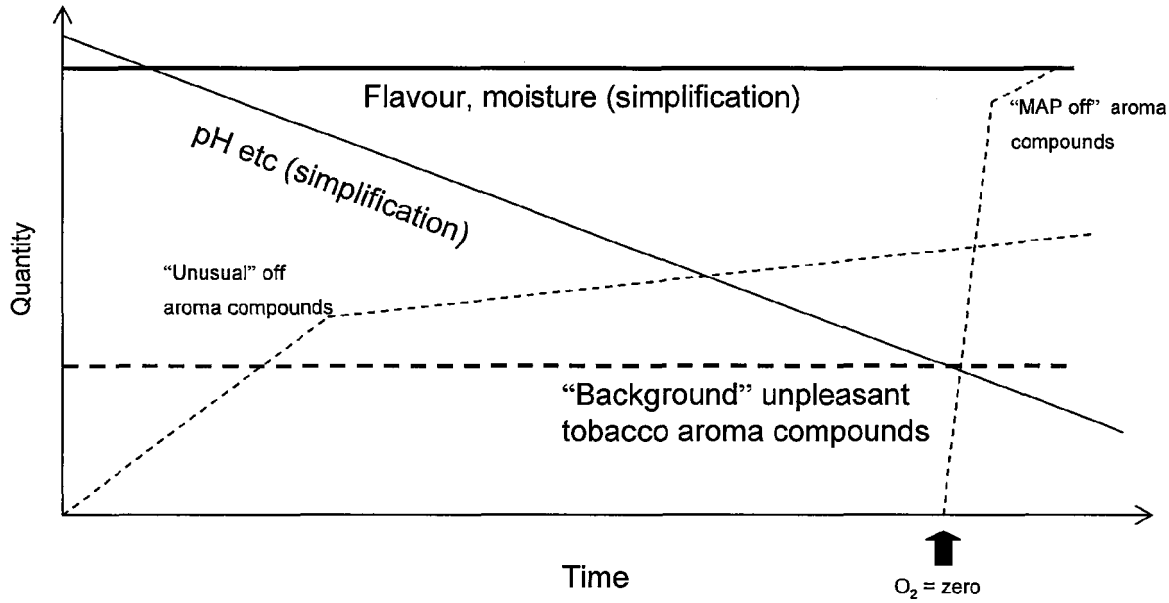


FIGURE 3

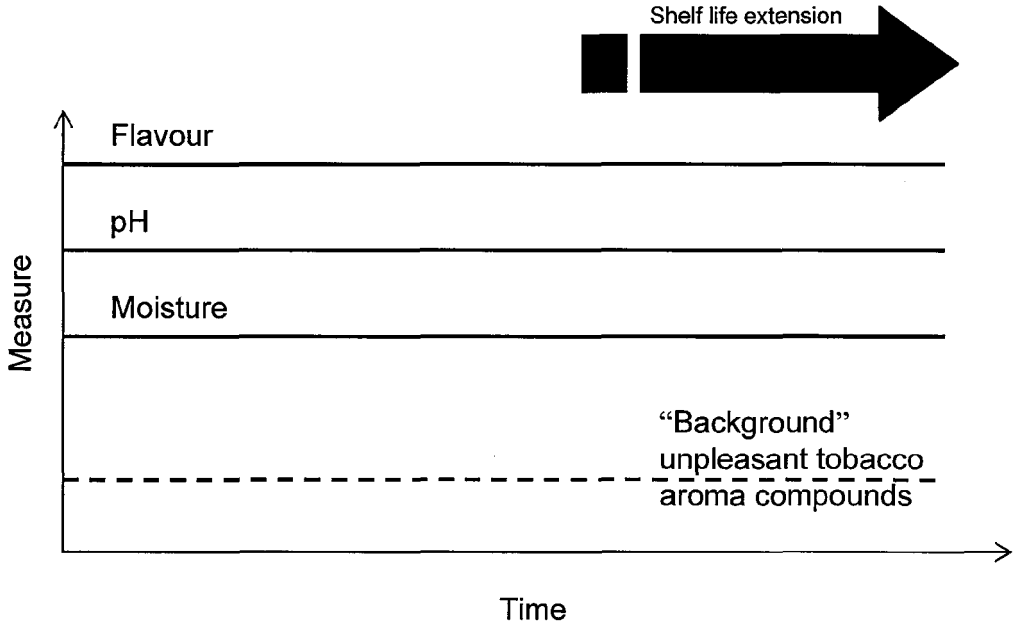


FIGURE 4

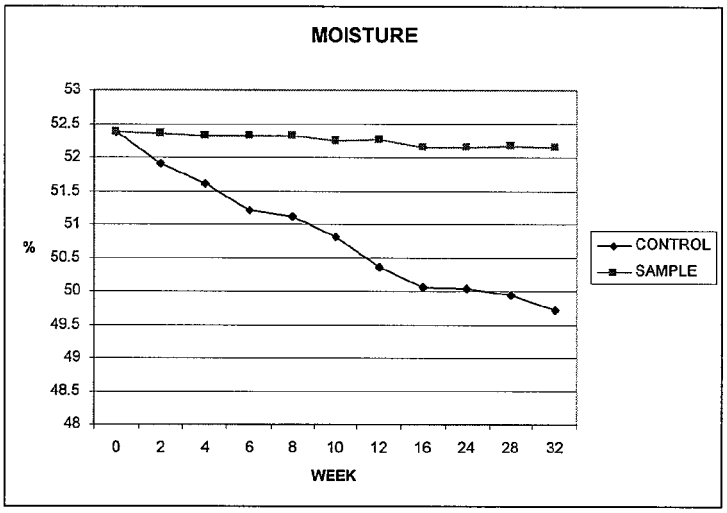


FIGURE 5

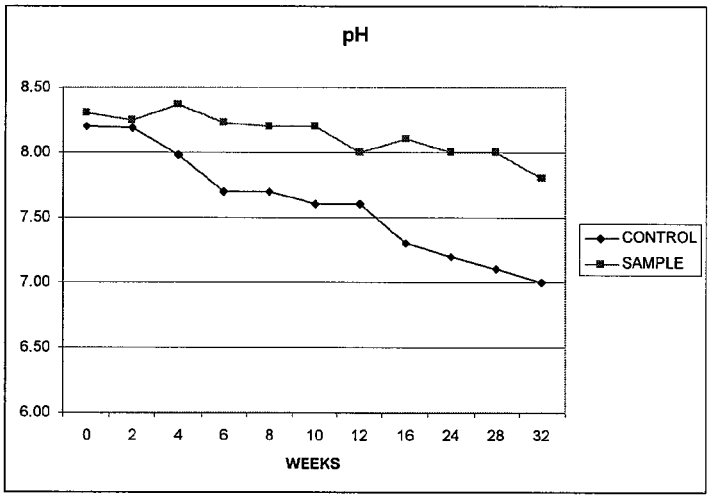


FIGURE 6

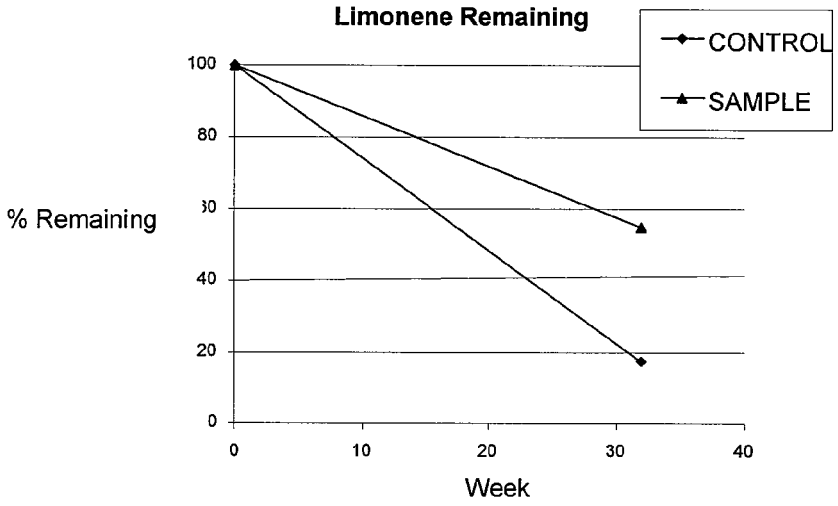


FIGURE 7A

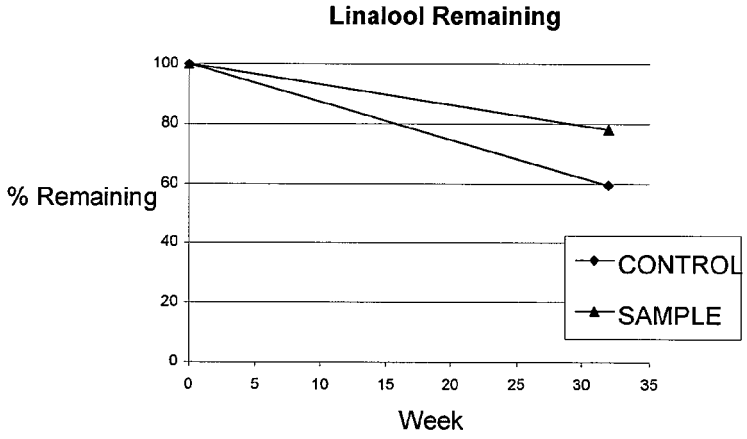


FIGURE 7B

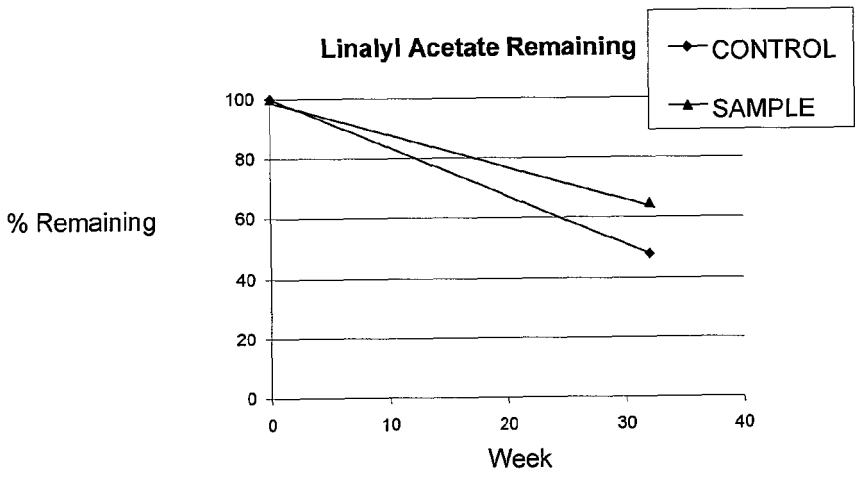


FIGURE 7C

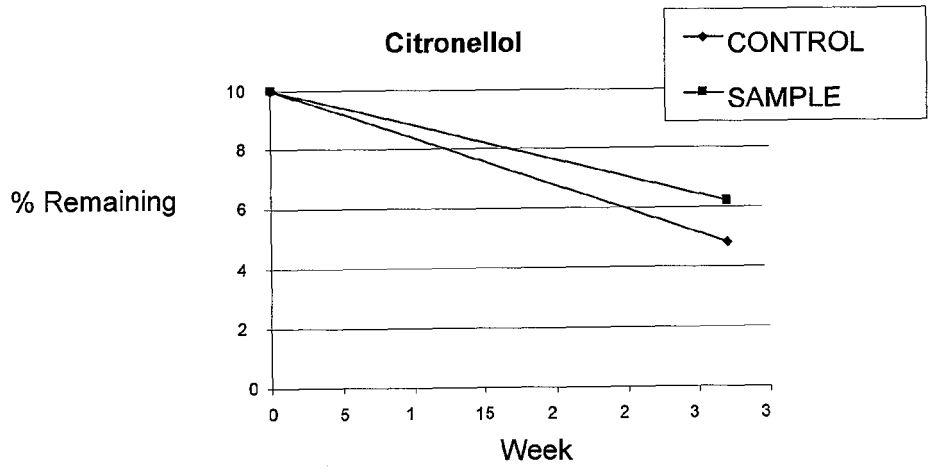


FIGURE 7D

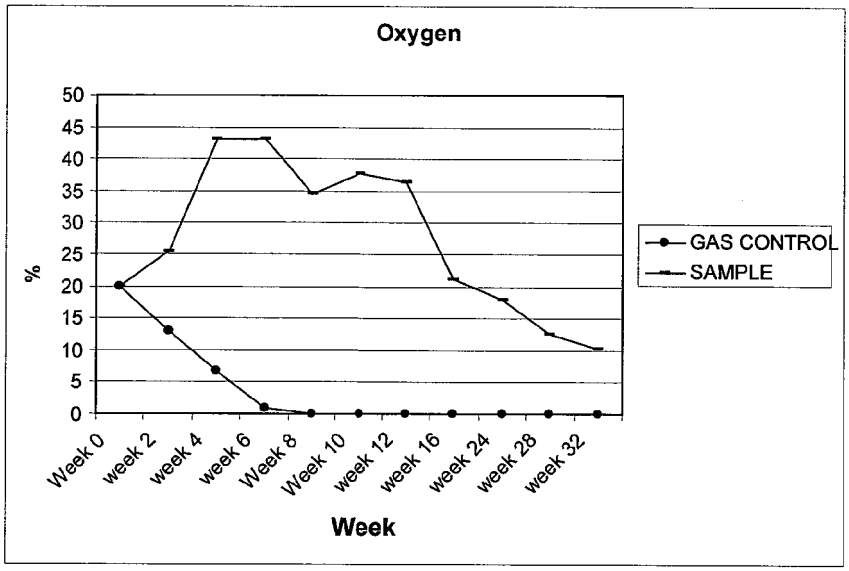


FIGURE 8

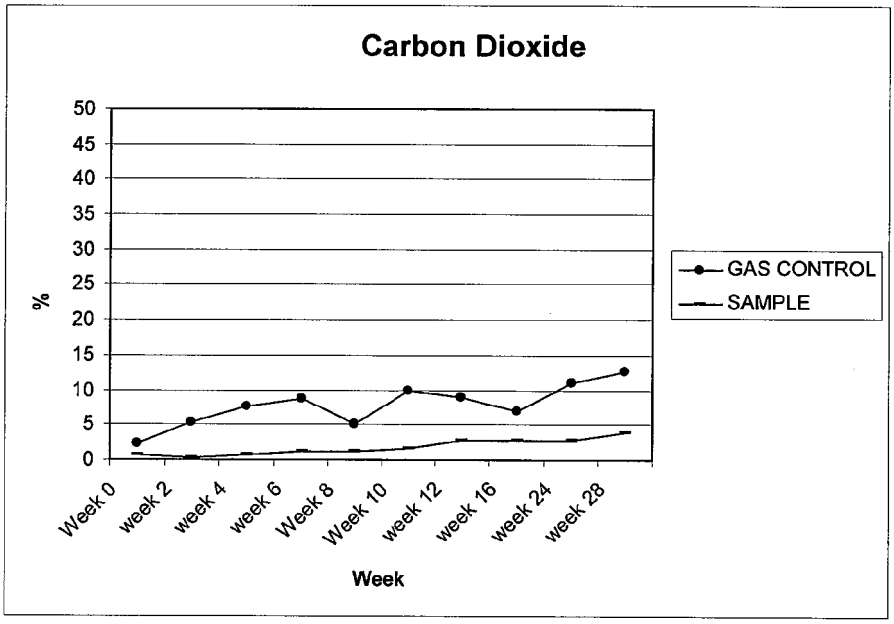


FIGURE 9

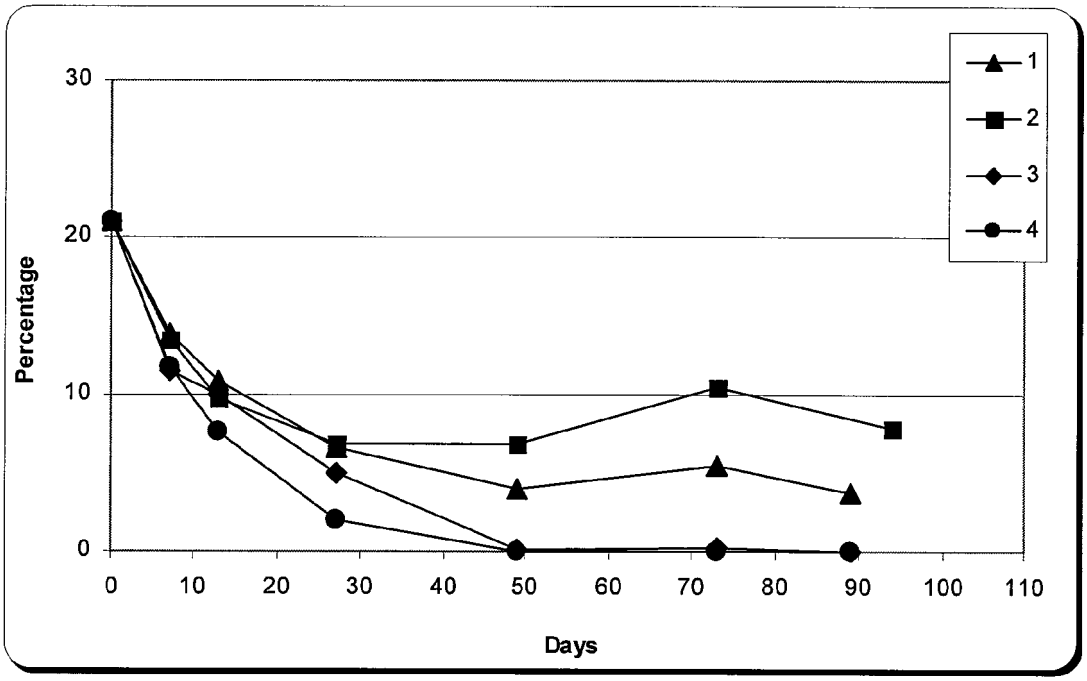

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Percentage
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10
20
30
40
50
60
70
80
90
100
110
Days
1
2
3
4

FIGURE 10

REFERENCES CITED IN THE DESCRIPTION

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