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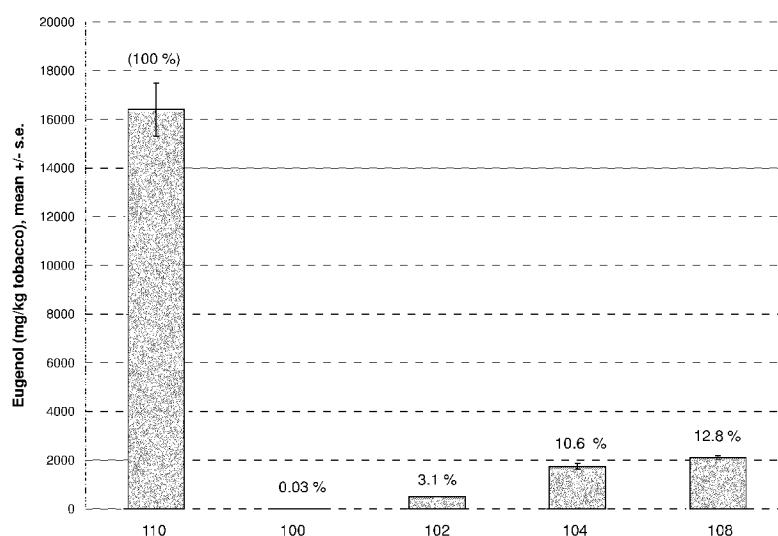
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(54) Title: FLAVOUR TRANSFER SYSTEM FOR TOBACCO

Fig. 1



(57) Abstract: There is provided a method of producing flavoured tobacco for use in smoking articles. The method comprises the steps of providing tobacco material, providing clove material, and storing the tobacco material and the clove material in proximity to one another within a container. During the storage, the tobacco material absorbs clove flavour from the clove material. The tobacco material and the clove material are separated from one another by a barrier. The barrier is configured to allow the clove flavour to transport from the clove material to the tobacco material through the barrier, around the barrier, or both through and around the barrier.

FLAVOUR TRANSFER SYSTEM FOR TOBACCO

The present invention relates to a method of producing flavoured tobacco for use in smoking articles. In particular, the present invention relates to a method of producing clove
5 flavoured tobacco for use in smoking articles.

Smoking articles, such as cigarettes, typically comprise a rod of tobacco cut filler aligned in an end-to-end relationship with a filter and attached thereto by tipping paper. A cigarette is employed by a smoker by lighting one end of the cigarette and burning the tobacco rod. The smoker then receives mainstream smoke into their mouth by drawing on
10 the filter end (mouth end) of the cigarette. The shredded tobacco can be a single type of tobacco or a blend of two or more types of tobacco depending on the brand of cigarette. Other known smoking articles include smoking articles in which tobacco material is heated, rather than combusted, to form an aerosol, and smoking articles in which a nicotine-containing aerosol is generated from tobacco material or tobacco extract without combustion
15 or heating.

To enhance the flavour of the mainstream smoke, it is known to provide smoking articles that include flavourants. In particular, it is known to provide filter cigarettes in which one or more flavourants are mixed with the tobacco in the tobacco rod in order to provide additional flavour to the mainstream smoke as the tobacco is burnt.

20 An example of such a smoking article is known as a "kretek" cigarette, in which clove material, such as clove particles, is included with the tobacco in the tobacco rod. The proportion of cloves to tobacco varies but may be as high as 50:50. Such smoking articles are popular in certain countries, such as Indonesia. As the cloves in kretek cigarettes are burnt, their flavour and aroma are released into the mainstream smoke.

25 Kretek cigarettes are popular, but cloves tend to be expensive and can suffer from an unstable supply. In addition, cigarettes including clove flavour are becoming more popular, both in Indonesia, and in other countries where, until now, clove cigarettes have been niche products having a reasonably limited market. Therefore, it is likely that demand for cloves will increase, and future demand may exceed supply. This is particularly significant for
30 cloves because of the slow growing cycle: the clove plant typically only starts to produce clove buds about 7 to 8 years after planting.

One solution to the potential clove shortage is to provide flavour directly from the phenylpropene eugenol, which is the compound primarily responsible for clove flavour. However, eugenol is typically extracted from natural clove, so this does not solve the clove
35 supply problems. Eugenol may be artificially produced, but the quality of the flavour may be lower than naturally extracted eugenol, and the artificial production process is expensive.

It would therefore be desirable to provide a method of producing flavoured tobacco for use in smoking articles and a method of manufacturing such smoking articles, in which substantially the same levels of clove flavour as in prior art arrangements are provided for a consumer, but in which less clove material is required.

5 According to the invention, there is provided a method of producing flavoured tobacco for use in smoking articles, the method comprising the steps of: providing tobacco material; providing clove material; storing the tobacco material and the clove material in proximity to one another within a container, such that the tobacco material absorbs clove flavour from the clove material, wherein the tobacco material and the clove material are separated from one
10 another by a barrier, the barrier configured to allow the clove flavour to transport from the clove material to the tobacco material through the barrier, around the barrier, or both through and around the barrier.

The inventor has found that, by storing the tobacco material in proximity to the clove material, the tobacco material can absorb clove flavour, in particular eugenol, from the clove
15 material. This, in turn, means that less clove material is required within a flavoured smoking article, in order to produce substantially the same level of flavour for a consumer as in current clove cigarettes, for example, kretek cigarettes, since the tobacco material is already infused with clove flavour. This results in a reduction in the amount of clove material required. Preferably, the container is sealed, for example hermetically sealed, so that the
20 volatile clove flavour compounds cannot escape.

Clove material, such as whole cloves, is often stored for a time before use in smoking articles, in any case (for example to benefit from a good clove harvest or a low clove price). During that time, clove flavour, in particular eugenol, may escape from the clove material into the atmosphere. The method of the invention makes use of this storage time and also
25 captures the clove flavour which would otherwise be wasted. The method can be incorporated into the usual manufacturing process.

Throughout this specification, the term "tobacco material" is used to denote the tobacco stored in proximity to clove material in accordance with the method of the invention. The tobacco could be a single type of tobacco or a blend of more than one type of tobacco, as discussed further below. The term "rod tobacco" is used to denote the tobacco (which
30 may be a single type of tobacco or a blend of more than one type of tobacco) in a finished smoking article. The tobacco material and the rod tobacco may be the same or may be different. In some cases, after being treated as described below, the tobacco material is blended with another tobacco to create the rod tobacco.

35 Throughout this specification, the term "smoking article" may comprise a filter cigarette, or another smoking article in which tobacco is combusted to form smoke. Alternatively, tobacco may be heated, rather than combusted, to form an aerosol. The

smoking article may alternatively be one in which a nicotine-containing aerosol is generated from, for example, a tobacco material or tobacco extract without combustion or heating. The terms “smoke” and “smoking” used in this specification should be interpreted in a similarly broad manner.

5 The term “clove” is used throughout this specification to denote the dried, unopened flower buds of the clove tree (*Syzygium aromaticum*, also known as *Eugenia caryophyllata*), commonly used as a spice.

10 The term “clove material” is used throughout this specification to denote any material derived from, or comprising, natural clove, which is suitable for imparting clove flavour into the tobacco material. The clove material may include whole cloves, clove particles (which may comprise ground or crushed cloves, or cloves that have been otherwise processed to reduce the particle size), cloves incorporated into a binder, sheet or carrier, clove oil, or combinations thereof. Preferably, however, the clove material comprises whole cloves, clove particles or both whole cloves and clove particles. Preferably, the whole cloves and clove
15 particles are untreated. That is, preferably, the whole cloves and clove particles are close to their natural state and are not incorporated into a carrier, or treated in any other way, other than standard aging or drying processes.

20 Cloves contain an essential oil, the main ingredient of which is eugenol (4-Allyl-2-methoxyphenol, chemical formula: $C_{10}H_{12}O_2$, Chemical Abstracts Service Registry Number 97-53-0). Eugenol is the compound primarily responsible for clove flavour.

25 The term “flavour” used throughout this specification, should be interpreted to include a gustatory sensation (taste), an olfactory sensation (smell), or both a gustatory sensation and an olfactory sensation. For example, the flavour absorbed by the tobacco material may impart a taste into the mainstream smoke to enhance the mainstream smoke in a smoking article. Alternatively or additionally, the flavour absorbed by the tobacco material may impart a fragrance into the mainstream smoke to enhance the mainstream smoke in a smoking article.

30 Eugenol is the compound primarily responsible for clove flavour and typically makes up between about 70% and about 90% of clove essential oil. However, the clove flavour also includes other compounds, for example, but not limited to acetyl eugenol, beta-caryophyllene and vanillin, crategolic acid, tannins such as bicornin, gallotannic acid, methyl salicylate, the flavonoids eugenin, kaempferol, rhamnetin and eugenitin, triterpenoids such as oleanolic acid, and sesquiterpenes. Determining that the tobacco material has absorbed clove flavour is preferably determined by measuring the eugenol content of the tobacco
35 material (or alternatively the eugenol content of smoke produced when the tobacco material is burnt). However, the absorption of clove flavour may also be determined by measuring the

content of other compounds found in clove essential oil including, but not limited to, those listed above.

The method may further comprise the step of incorporating the clove flavoured tobacco material (produced by the tobacco material absorbing clove flavour from the clove material) into a tobacco rod for a smoking article.

Once the clove flavoured tobacco material has been incorporated into a smoking article, the clove material may be used again to impart clove flavour, in particular eugenol, to fresh tobacco material. During storage, eugenyl acetate in the clove material is converted into more flavoursome eugenol. It has been found that the clove material may be used many times before there is any significant reduction in clove flavour transfer. The number of times that the clove material may be re-used may be primarily determined by the usual total storage time of the clove material (for example, between harvest and incorporation into a smoking article), and the time desired for storage of the clove material in proximity to the tobacco material. For example, if clove material is generally stored for a period of about 6 months between harvest and incorporation into a smoking article, and it is desired for the clove material to be stored in close proximity to the tobacco material for a period of about 8 weeks, the clove material may be re-used three times. It is possible for whole cloves to be used initially to impart clove flavour to tobacco material. If there is any reduction in clove flavour transfer after one or more uses of the whole cloves, the whole cloves may be cut. The cut cloves may then be used to impart clove flavour to fresh tobacco material.

The clove flavoured tobacco material may be incorporated into the tobacco rod for the smoking article either as the only tobacco component of the tobacco rod, or together with another tobacco or tobaccos in the tobacco rod.

In one embodiment, the tobacco rod comprises substantially 100% of the clove flavoured tobacco material. That is, no additional clove material is added to the clove flavoured tobacco material when the tobacco material is incorporated into the tobacco rod (although it is possible that remnants of clove material remain from the proximity of the clove material and the tobacco material during storage). This may provide a smoking article having a subtle clove flavour, which may be favoured by some consumers.

Alternatively, the method may further comprise the step of combining clove material with the tobacco material in the tobacco rod.

Because the tobacco material has absorbed clove flavour, less clove material is required in order to produce substantially the same level of clove flavour for a consumer as provided by prior art clove flavoured smoking articles, for example kretek cigarettes. The inventor has found that as much as 15% less clove material may be required, depending on, among other things, the storage time, the type of tobacco material and the presence or absence of a humectant.

The clove material incorporated into the tobacco rod may be the same clove material stored in proximity to the tobacco material. As already discussed, clove material, such as whole cloves and clove particles, is often stored for a time before use in smoking articles, during which time, clove flavour may escape from the clove material into the atmosphere.

5 Therefore, using the clove material which has already been stored in proximity to the tobacco material, within the tobacco material in the smoking article tobacco rod, does not generally produce a tobacco rod which is less flavoursome than known prior art arrangements. In fact, the clove material used in the tobacco rod is typically the same as that used in known clove cigarettes. However, since clove flavour has been absorbed by the
10 tobacco material, less clove material may be used in order to provide the same flavoursome smoking experience for a consumer. Alternatively, the clove material incorporated into the tobacco rod may be clove material other than the clove material which was stored in proximity to the tobacco material.

Preferably, during the storage, the ratio of clove material to tobacco material by weight
15 is between about 1:2 and about 2:1. Even more preferably, during the storage, the ratio of clove material to tobacco material by weight is between about 2:3 and about 3:2.

Preferably, during the storage, the temperature is maintained at a temperature higher than ambient temperature. This may enhance clove flavour transfer. Preferably, during storage, the temperature is maintained at at least 25 degrees Centigrade, more preferably,
20 at least 30 degrees Centigrade, even more preferably, at least 35 degrees Centigrade.

Preferably, during the storage, the relative humidity is maintained at a relative humidity higher than ambient relative humidity. This may enhance clove flavour transfer. Preferably, during storage, the relative humidity is maintained at at least 40%, more preferably, at least 50%, even more preferably, at least 60%.

25 The step of storing the tobacco material and the clove material in proximity to one another may comprise storing the tobacco material and the clove material in proximity to one another for at least two weeks, preferably at least four weeks, more preferably at least eight weeks.

The method may further comprise the step of moving the tobacco material, the clove
30 material or both the tobacco material and the clove material at least once during the storage. Agitating the tobacco material or clove material by moving (for example, stirring, shaking or mixing) may enhance the flavour transfer.

The tobacco rod of a smoking article, for example a cigarette, typically comprises a paper wrapper in which rod tobacco is wrapped. Adhesive generally holds the seams of the
35 paper wrapper together. The tobacco rod has a first, downstream end which is attached to the filter and a second, upstream end which is lit or heated for smoking the tobacco. When

the tobacco rod is lit or heated for smoking, the smoke travels from the lit end downstream to the filter end of the tobacco rod and further downstream through the filter.

The tobacco material provided for storage according to the method of the invention may be provided in any suitable form, as set out below. This may be the same form as the rod tobacco in a finished smoking article. Alternatively, the tobacco material may be further
5 treated after storage before being incorporated into a smoking article.

The tobacco material during storage and the rod tobacco in a finished smoking article may be provided in any suitable form, including, but not limited to, tobacco lamina, processed tobacco materials, such as volume expanded or puffed tobacco, processed
10 tobacco stems, such as cut-rolled or cut-puffed stems, whole or cut tobacco flakes, reconstituted tobacco materials, blends thereof, and the like. Tobacco substitutes may also be used. Casing may be applied to the tobacco material before or after the storage. In traditional cigarette manufacture, the rod tobacco is normally used in the form of cut filler, that is, in the form of shreds or strands cut into widths ranging from about 2.5 mm to about
15 1.2 mm or even about 0.4 mm. The lengths of the strands range from between about 6 mm to about 75 mm. In a preferred embodiment, the tobacco material during storage is in the form of whole tobacco leaves, which are then cut to form cut filler for rod tobacco for finished smoking articles.

As already discussed, the tobacco material stored in proximity to the clove material
20 may be combined with another tobacco or tobaccos when incorporated into a smoking article.

Examples of suitable types of tobacco materials that may be used include, but are not limited to, flue-cured tobacco, Burley tobacco, Maryland tobacco, Oriental tobacco, Virginia tobacco, other rare or speciality tobaccos, blends thereof and the like.

Burley is a type of tobacco which plays a significant role in many tobacco blends. Burley has a distinctive flavour and aroma and also has an ability to absorb large amounts of casing. The inventor has found that Burley is particularly good at absorbing clove flavour (in particular eugenol) according to the method of the invention. Clove flavour transfer may be high using Burley tobacco due to Burley tobacco's good absorbent properties. Therefore,
25 preferably, the step of providing tobacco material (for the storage) comprises providing tobacco material comprising at least about 20% Burley tobacco, or in some cases the tobacco material comprises substantially 100%, that is, it consists essentially of, Burley tobacco. The inventor has found that the amount of eugenol absorbed by Burley tobacco increases with storage time (at least between 2 weeks and 8 weeks of storage).
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Flue-curing is a method of curing tobacco, which is particularly used with Virginia tobaccos. During the flue-curing process, heated air is circulated through densely packed tobacco. During a first stage, the tobacco leaves turn yellow and wilt. During a second stage,
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the laminae of the leaves are completely dried. During a third stage, the leaf stems are completely dried.

The inventor has found that the amount of eugenol absorbed by flue cured Virginia tobacco increases with storage time (at least between 2 weeks and 8 weeks of storage). However, overall, the amount of eugenol absorbed may be less than that absorbed by Burley tobacco. Therefore, it may be advantageous to limit the amount of flue-cured tobacco in the tobacco material stored in proximity to the clove material. The step of providing tobacco material (for the storage) may comprise providing tobacco material comprising no more than about 30% flue-cured tobacco.

Oriental is a type of tobacco which has small leaves, and high aromatic qualities. However, Oriental tobacco has a milder flavour than, for example, Burley. Generally, therefore, Oriental tobacco is used in relatively small proportions in tobacco blends.

The inventor has found that the amount of eugenol absorbed by Oriental tobacco increases with storage time (at least between 2 weeks and 8 weeks of storage). Overall, the amount of eugenol absorbed may be comparable to or slightly less than that absorbed by flue-cured Virginia tobacco. Therefore, it may be advantageous to limit the amount of Oriental tobacco in the tobacco material. The step of providing tobacco material (for the storage) may comprise providing tobacco material comprising no more than about 50% Oriental tobacco.

In one embodiment, the step of providing tobacco material comprises providing tobacco material comprising no more than about 30% flue-cured tobacco and no more than about 50% Oriental tobacco.

The inventor has found that the clove flavour absorption effect may be enhanced, particularly for some types of tobacco material, by including a humectant, such as polypropylene glycol, with the tobacco material. Therefore, in one embodiment, the step of providing tobacco material comprises providing tobacco material comprising a humectant.

The term "humectant" used throughout this specification refers to a substance used with the tobacco material in order to assist the tobacco material in retaining moisture. Examples of suitable humectants include polypropylene glycol, glycerine, and sorbitol. The tobacco material may comprise between about 0.25% by weight and about 10% by weight humectant. More preferably, the tobacco material comprises between about 1% by weight and about 6% by weight humectant. The particular percentage of humectant may depend on the humectant or humectants used and the type or types of tobacco in the tobacco material.

The tobacco material and the clove material may be stored alongside one another. Alternatively, the tobacco material and the clove material may be stored above and below one another. This will depend on the particular equipment used. In some cases, the tobacco material and the clove material may be stored in proximity to one another within a dedicated

chamber. In some cases, the tobacco material and the clove material may be stored within a sealed container. An air permeable barrier may be used between the tobacco material and the clove material. The air permeable barrier may be any barrier which does not allow the tobacco material and the clove material to mix. The air permeable barrier may allow the clove flavour to permeate through the barrier. For example, the air permeable barrier may comprise a mesh or net. In addition, or alternatively, the barrier may allow the clove flavour to transfer adjacent the barrier, for example above or alongside the barrier.

The container may be any suitable container which is able to contain the clove material and the tobacco material and limit the amount of clove flavour, in particular eugenol, escaping. In some cases, the container may comprise a building that is configured to house both the tobacco material and the clove material as described herein. In some cases, the building may be a silo structure. For example, the container may comprise a horizontal cut filler silo, having a first compartment for storing the tobacco material and a second compartment for storing the clove material, wherein the first and second compartments are separated by the barrier, which may be an air permeable barrier.

The horizontal cut filler silo may be any suitable silo, for example, but not limited to, one manufactured by Garbuio Dickinson, Italy or Hauni Maschinenbau AG, Germany. The tobacco material may be stored in an upper compartment of the silo and the clove material may be stored in a lower compartment of the silo. In other embodiments, the tobacco material and the clove material may be stored in a side-by-side configuration. The silo may be sealed.

Preferably, the container is hermetically sealed. That is to say, preferably, the container is airtight so that close to zero clove flavour, in particular eugenol, may escape into the environment outside the container. This maximises the transfer of clove flavour to the tobacco material.

The barrier may comprise any suitable material which allows clove flavour to permeate through or around or both through and around the barrier. The barrier may be air permeable, so as to allow the clove flavour to permeate through the barrier. For example, the air permeable barrier may comprise a mesh. If the air permeable barrier comprises a mesh, preferably the mesh has a mesh size less than the size of about 95% of the plant material (tobacco material and clove material) pieces. In addition, or alternatively, the barrier may allow the clove flavour to transfer adjacent the barrier, for example above or alongside the barrier. If the container comprises a horizontal cut filler silo, the barrier may comprise a transport band in the silo. For example, if the tobacco material is stored in an upper compartment of the silo, the barrier may comprise the upper compartment transport band.

The term "in proximity to one another", used throughout this specification to refer to the storage locations of the clove material and the tobacco material, denotes sufficiently close to

allow transfer of clove flavour from the clove material to the tobacco material. The particular level of proximity will depend on the size of the equipment, particularly the container. For example, the container may have dimensions of 33 cm (length) x 23 cm (width) x 19 cm (depth), in which case the maximum separation of the clove material and tobacco material during storage will be about 33 cm.

Features and advantages described in relation to one aspect of the invention may also be applicable to another aspect of the invention.

The invention will be further described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a graph showing eugenol content (mg per kg of tobacco) in five tobacco material samples;

Figure 2 is a graph showing eugenol content in smoke (μg per cigarette) of handmade prototypes of five tobacco samples; and

Figure 3 is a graph showing eugenol content (mg per kg of tobacco) in four tobacco material samples for three tobacco types, both with and without humectant.

As already discussed, the invention provides a method of producing flavoured tobacco for use in smoking articles. The method comprises storing tobacco material and clove material (preferably whole cloves or clove particles) in proximity to one another within a container. The tobacco material and the clove material are separated from one another by a barrier.

The inventors of the present invention have found that, during the storage, the tobacco material absorbs clove flavour, in particular eugenol, from the clove material. This means that, when the tobacco material is incorporated into a smoking article, less clove material is required to produce substantially the same clove flavour as in prior art clove cigarettes, because the tobacco material has already absorbed some clove flavour. Alternatively, the clove flavoured tobacco material may be used without additional clove material to provide a more subtle clove flavour.

Figures 1 and 2 show the results of an investigation performed to determine how much clove flavour, specifically eugenol, is absorbed by tobacco material when stored in proximity to clove material in accordance with one embodiment of the method of the invention. In the investigation, the tobacco material, in the form of cut filler, was exposed to clove material, in the form of cut pieces of clove, within a closed container. The tobacco material comprised a tobacco blend (primarily comprising Java tobacco and American tobacco) used to manufacture kretek cigarettes already available on the market, but without any clove content, together with 4.2% by weight propylene glycol and 1.4% by weight sorbitol, added as humectants. 210 g of the tobacco material and 90 g of the clove material was stored in a container measuring 23 cm x 33 cm x 19 cm, with the tobacco material and clove material

separated by a thin dividing wall which allowed clove flavour to transfer in a space above the dividing wall. Tobacco material samples were taken initially (before storage), after 2 weeks storage, after 4 weeks storage and after 8 weeks storage. Three replicates were taken of each sample and the results averaged.

5 Figure 1 shows a first set of results of the investigation. Figure 1 is a graph showing the eugenol content in five separate tobacco material samples, 110, 100, 102, 104, 108. The eugenol content is measured in milligrams (mg) per kilogram (kg) of tobacco material. Sample 110 is a sample from a kretek cigarette already available on the market. The eugenol content of sample 110 is denoted 100% in Figure 1, since consumers are
10 accustomed to the clove flavour, in particular eugenol content, of such cigarettes, so this eugenol content may be regarded as a reference value. Sample 100 is the tobacco material sample (of the same tobacco blend as sample 110, but without clove material) which has not been stored in proximity to the clove material. Sample 102 is the tobacco material sample (of the same tobacco blend as sample 110, but without clove material) which has been stored,
15 according to the above-described embodiment of the invention, in proximity to clove material within the sealed container for a period of 2 weeks. Sample 104 is the tobacco material sample (of the same tobacco blend as sample 110, but without clove material) which has been stored, according to the above-described embodiment of the invention, in proximity to clove material within the sealed container for a period of 4 weeks. Sample 108 is the tobacco
20 material sample (of the same tobacco blend as sample 110, but without clove material) which has been stored, according to the above-described embodiment of the invention, in proximity to clove material within the sealed container for a period of 8 weeks.

It can be seen that, without storage in proximity to clove material (sample 100), the eugenol content of the tobacco material is negligible. After 2 weeks storage in proximity to
25 clove material (sample 102), the eugenol content of the tobacco material is about 3.1% of that of sample 110. After 4 weeks storage in proximity to clove material (sample 104), the eugenol content of the tobacco material is about 10.6% of that of sample 110. After 8 weeks storage in proximity to clove material (sample 108), the eugenol content of the tobacco material is about 12.8% of that of sample 110.

30 Thus, it can be seen that, during the storage of the clove material and the tobacco material in proximity to one another, the tobacco material absorbs clove flavour, in particular eugenol, from the clove material. The amount of eugenol absorbed by the tobacco material generally increases with the time of storage (at least between 2 weeks and 8 weeks storage). Referring to Figure 1, after 8 weeks storage, the tobacco material includes about
35 12.8% of the eugenol found in standard kretek cigarettes. This means that, when that tobacco material is incorporated into a smoking article, potentially up to 12.8% less clove

material may be required to produce substantially the same clove flavour as in those standard kretek cigarettes.

Figure 2 shows a second set of results of the investigation. Tobacco samples were taken as in Figure 1 (before storage, after 2 weeks storage, after 4 weeks storage and after 5 8 weeks storage) and cigarette prototypes incorporating the tobacco samples were made by hand. Figure 2 is a graph showing the eugenol content in five separate cigarette smoke samples 210, 200, 202, 204, 208 (produced using the Health Canada Intense (HCI) smoking method). The eugenol content is measured in micrograms (μg) in the smoke of one cigarette. Sample 210 is a smoke sample from a kretek cigarette already available on the 10 market. The eugenol content of smoke sample 210 is denoted 100% in Figure 2, since consumers are accustomed to the clove flavour, in particular eugenol content, in the smoke of such cigarettes, so this eugenol content may be regarded as a reference value. Sample 200 is the smoke sample (for cigarettes of the same tobacco blend as sample 210, but without clove material) in which the tobacco material of the cigarette has not been stored in 15 proximity to the clove material. Sample 202 is the smoke sample (for cigarettes of the same tobacco blend as sample 210, but without clove material) in which the tobacco material of the cigarette has been stored, according to the above-described embodiment of the invention, in proximity to clove material within the sealed container for a period of 2 weeks. Sample 204 is the smoke sample (for cigarettes of the same tobacco blend as sample 210, 20 but without clove material) in which the tobacco material of the cigarette has been stored, according to the above-described embodiment of the invention, in proximity to clove material within the sealed container for a period of 4 weeks. Sample 208 is the smoke sample (for cigarettes of the same tobacco blend as sample 210, but without clove material) in which the tobacco material of the cigarette has been stored, according to the above-described 25 embodiment of the invention, in proximity to clove material within the sealed container for a period of 8 weeks.

It can be seen that, without storage in proximity to clove material (sample 200), the eugenol content of the smoke is negligible. After 2 weeks storage in proximity to clove material (sample 202), the eugenol content of the smoke is about 1.7% of that of sample 30 210. After 4 weeks storage in proximity to clove material (sample 204), the eugenol content of the smoke is about 3.1% of that of sample 210. After 8 weeks storage in proximity to clove material (sample 208), the eugenol content of the smoke is about 6.4% of that of sample 210.

Thus, it can be seen that, during the storage of the clove material and the tobacco 35 material in proximity to one another, the tobacco material absorbs clove flavour and this produces a higher eugenol content in the smoke, when a cigarette comprising the tobacco material is smoked. The amount of eugenol absorbed by the tobacco material, and hence

contained in the smoke, generally increases with the time of storage (at least between 2 weeks and 8 weeks storage). Referring to Figure 2, after 8 weeks storage, the cigarette smoke includes about 6.4% of the eugenol found in the smoke of standard kretek cigarettes. This means that, when that tobacco material is incorporated into a smoking article, potentially up to 6.4% less clove material may be required to produce substantially the same clove flavour in the smoke as in those standard kretek cigarettes.

Thus, it can be seen from Figures 1 and 2 that storing tobacco material in proximity to clove material in a container in accordance with the method of the invention causes the tobacco material to absorb clove flavour, in particular eugenol, from the clove material. This means that, when the tobacco material is incorporated into a smoking article, less clove material is required to produce substantially the same clove flavour as in prior art clove cigarettes, because the tobacco material has already absorbed some clove flavour.

Figure 3 shows the results of a second investigation to determine whether the amount of clove flavour, specifically eugenol, absorbed by tobacco material when stored in proximity to clove material in accordance with one embodiment of the method of the invention is dependent on either of: - tobacco blend, and - presence or absence of polypropylene glycol added as a humectant. The experimental design was the same as described above with reference to Figures 1 and 2, but three different types of tobacco (Burley tobacco, flue-cured Virginia tobacco and Oriental tobacco) were used, both with (4.5% by weight) and without polypropylene glycol added as a humectant.

Figure 3 is a graph showing the eugenol content in four separate tobacco material samples for each of Burley tobacco without polypropylene glycol (samples 300, 302, 304, 308), Burley tobacco with 4.5% polypropylene glycol (samples 300PG, 302PG, 304PG, 308PG), flue-cured Virginia tobacco without polypropylene glycol (samples 400, 402, 404, 408), flue-cured Virginia tobacco with 4.5% polypropylene glycol (samples 400PG, 402PG, 404PG, 408PG), Oriental tobacco without polypropylene glycol (samples 500, 502, 504, 508), and Oriental tobacco with 4.5% polypropylene glycol (samples 500PG, 502PG, 504PG, 508PG). Tobacco material samples were taken after no storage (samples 300, 300PG, 400, 400PG, 500, 500PG), after 2 weeks storage in proximity to the clove material (samples 302, 302PG, 402, 402PG, 502, 502PG), after 6 weeks storage in proximity to the clove material (samples 304, 304PG, 404, 404PG, 504, 504PG) and after 8 weeks storage in proximity to the clove material (308, 308PG, 408, 408PG, 508, 508PG). As before, three replicates were taken of each sample and the results averaged. As in Figure 1, the eugenol content is measured in milligrams (mg) per kilogram (kg) of tobacco material.

As in Figures 1 and 2, in Figure 3, the eugenol contents (% values) are shown relative to that of a kretek cigarette already available on the market. However, the kretek cigarette 100% reference values are not shown in Figure 3 for clarity.

It can be seen that, for all three tobacco types, the amount of eugenol absorbed by the tobacco material generally increases with the time of storage (at least between 2 weeks and 8 weeks storage). This agrees with Figure 1. Burley tobacco generally absorbs more eugenol than both flue-cured Virginia tobacco and Oriental tobacco and this was found to be statistically significant ($p < 0.05\%$). The absorption effect may be further increased for flue-cured Virginia tobacco and Oriental tobacco by adding a humectant (4.5% propylene glycol in this study).

In equipment which may be used for storage of tobacco material and clove material on an industrial scale, the container may comprise a horizontal cut filler silo with two level storage, for example, as manufactured by Garbuio Dickinson, Italy or Hauni Maschinenbau AG, Germany. The silo is hermetically sealed to maximise clove flavour transfer. Each storage level has a transport band to empty the silo. The clove material, preferably whole cloves or pieces of whole clove, is stored in the lower storage level and the tobacco material is stored in the upper storage level. The upper transport band, which acts as an air permeable barrier, is manufactured of permeable material to allow clove flavour to transfer through the band into the tobacco material. After the required storage time, the tobacco material in the upper storage level will have the desired eugenol content. At that time, the upper storage level can be emptied and refilled similar to any other known batch process. The clove material stored on the lower storage level may be used as long as the required eugenol transfer to the tobacco material is achieved. At that time, the lower storage level can also be emptied and refilled similar to any other known batch process. The clove particles may then be used to add to the cut filler in a clove cigarette.

CLAIMS

1. A method of producing flavoured tobacco for use in smoking articles, the method comprising the steps of:

5 providing tobacco material;

providing clove material;

storing the tobacco material and the clove material in proximity to one another within a container, such that the tobacco material absorbs clove flavour from the clove material, wherein the tobacco material and the clove material are separated from one another by a
10 barrier, the barrier configured to allow the clove flavour to transport from the clove material to the tobacco material through the barrier, around the barrier, or both through and around the barrier.

2. A method according to claim 1, further comprising the step of incorporating the clove
15 flavoured tobacco material into a tobacco rod for a smoking article.

3. A method according to claim 2, wherein the tobacco rod comprises substantially 100% of the clove flavoured tobacco material.

20 4. A method according to claim 2, further comprising the step of combining clove material with the tobacco material in the tobacco rod.

5. A method according to any preceding claim wherein, during the storage, the ratio of clove material to tobacco material by weight is between about 1:2 and about 2:1.

25

6. A method according to any preceding claim wherein, during the storage, the temperature is maintained at at least 25 degrees Centigrade.

7. A method according to any preceding claim wherein, during the storage, the relative
30 humidity is maintained at at least 40%.

8. A method according to any preceding claim, wherein the step of storing the tobacco material and the clove material in proximity to one another comprises storing the tobacco material and the clove material in proximity to one another for at least two weeks, preferably
35 at least four weeks, more preferably at least eight weeks.

9. A method according to any preceding claim, further comprising the step of moving the tobacco material, the clove material or both the tobacco material and the clove material at least once during the storage.

5 10. A method according to any preceding claim, wherein the step of providing tobacco material comprises providing whole tobacco leaves which may subsequently be cut into strands of tobacco.

11. A method according to any preceding claim, wherein the step of providing tobacco
10 material comprises providing tobacco material comprising at least about 20% Burley tobacco.

12. A method according to any preceding claim, wherein the step of providing tobacco
15 material comprises providing tobacco material comprising no more than about 30% flue-cured tobacco and no more than about 50% Oriental tobacco.

13. A method according to any preceding claim, wherein the step of providing tobacco material comprises providing tobacco material comprising a humectant.

20 14. A method according to any preceding claim, wherein the container is hermetically sealed.

15. A method according to any preceding claim, wherein the container comprises a horizontal cut filler silo, having a first compartment for storing the tobacco material and a
25 second compartment for storing the clove material, wherein the first and second compartments are separated by the barrier.

Fig. 1

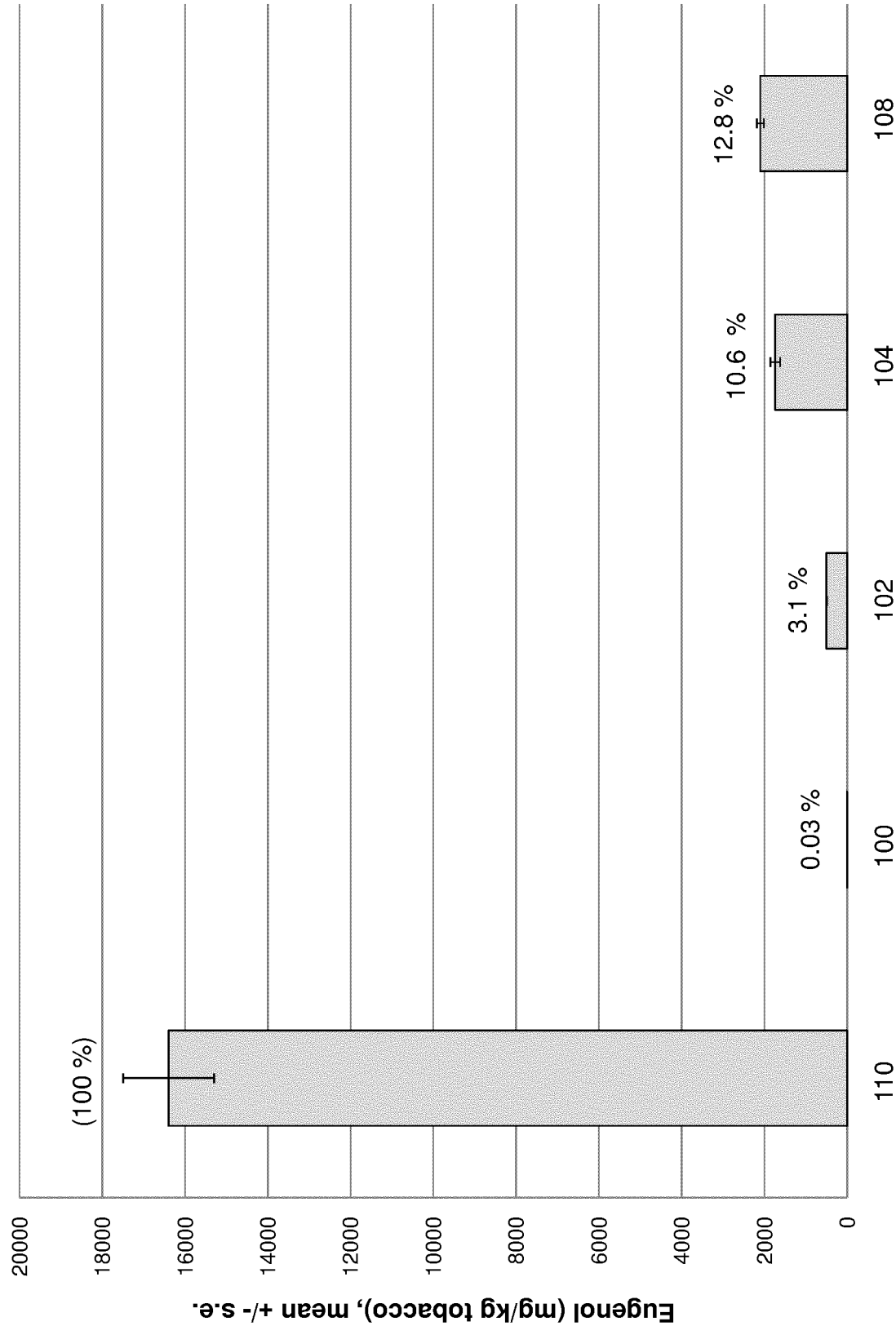


Fig. 2

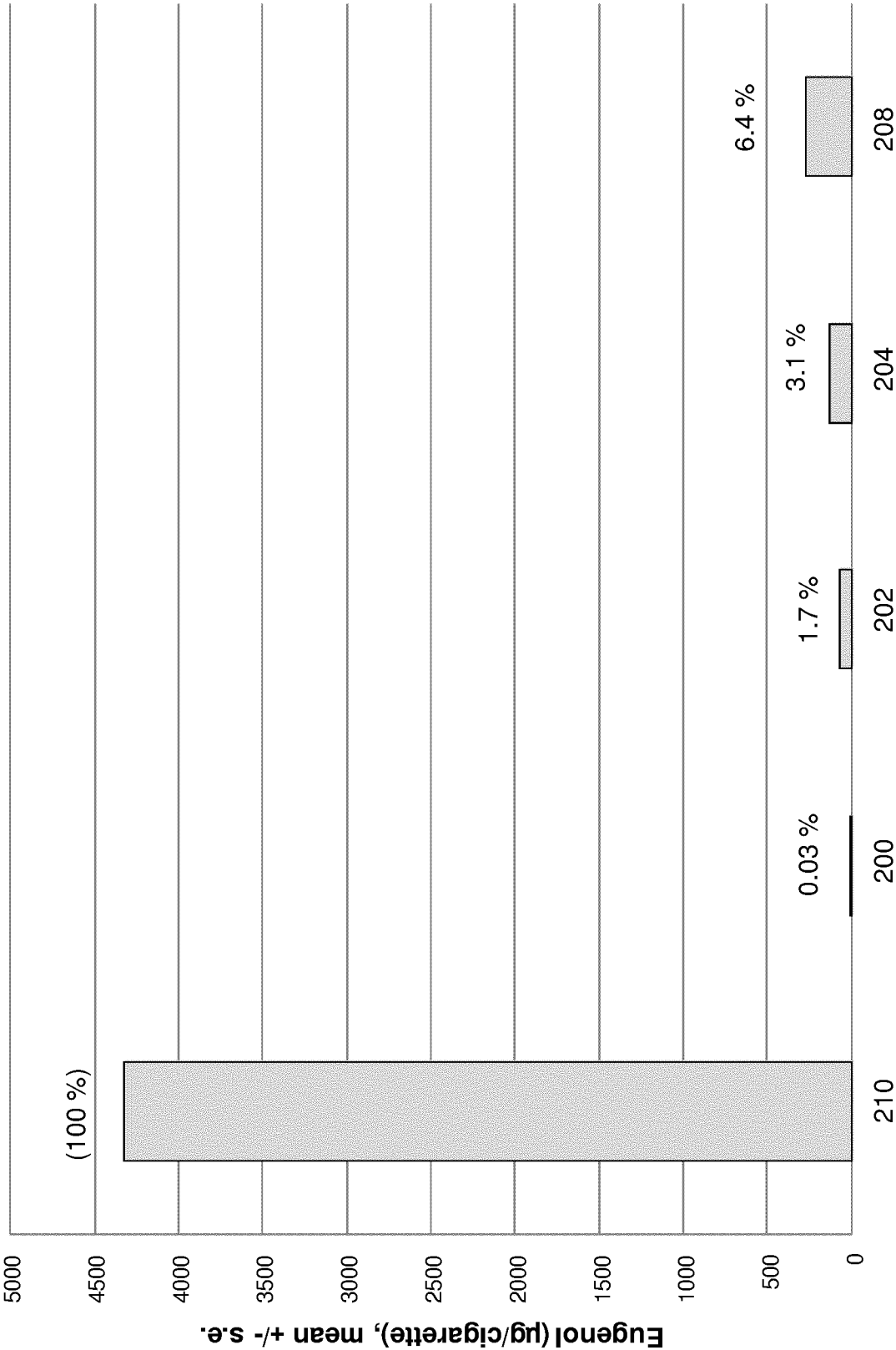
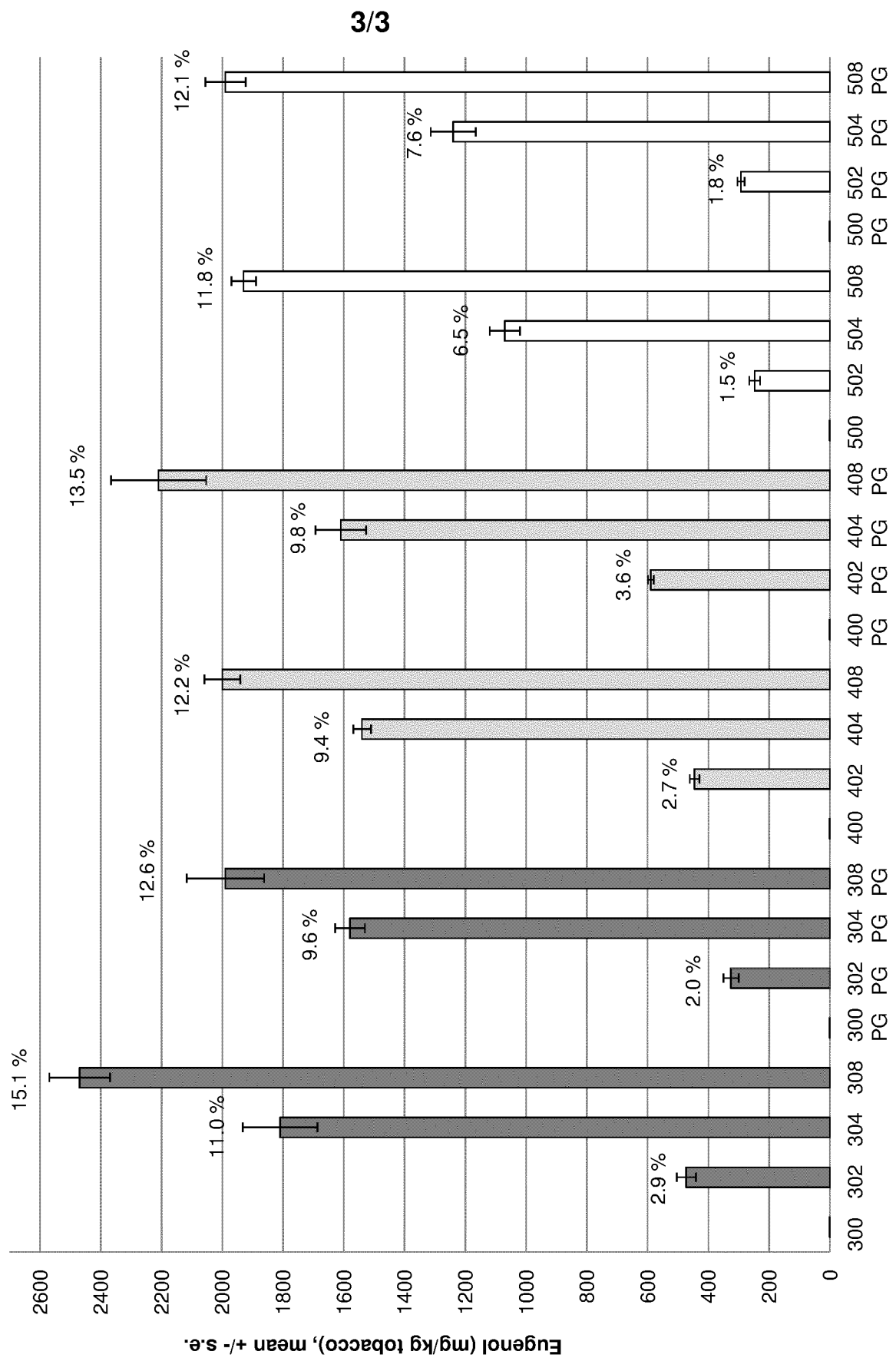


Fig. 3



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/068863A. CLASSIFICATION OF SUBJECT MATTER
INV. A24B3/12
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A24B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2012/123289 A1 (BRITISH AMERICAN TOBACCO CO [GB]; MCLELLAN ANDREW [GB]; HEPWORTH RICHARD) 20 September 2012 (2012-09-20) the whole document -----	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2014/068863

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