US 20250098735A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2025/0098735 A1**

**ALIT et al.** (43) **Pub. Date: Mar. 27, 2025**

(54) **A SUSTAINABLE SMOKING ARTICLE ELEMENT**

(71) Applicant: **FILTRONA PTE. LTD.**, Singapore (SG)

(72) Inventors: **Ni Gusti Nyoman ALIT**, Sidoarjo (ID); **Boby ALEXANDER**, Sidoarjo (ID); **Naqib AHMED**, Jarrow (GB); **Rosi Ana QOLBI**, Sidoarjo (ID); **Ian ANINDYA**, Sidoarjo (ID); **N/A GIYANTO**, Sidoarjo (ID); **Sulistyo WIDODO**, Sidoarjo (ID); **Sudirman WIDIARTO**, Singapore (SG)

(21) Appl. No.: **18/729,667**

(22) PCT Filed: **Jan. 20, 2023**

(86) PCT No.: **PCT/GB2023/050129**

§ 371 (c)(1),
(2) Date: **Jul. 17, 2024**

(30) **Foreign Application Priority Data**

Jan. 21, 2022 (GB) ..... 2200788.4

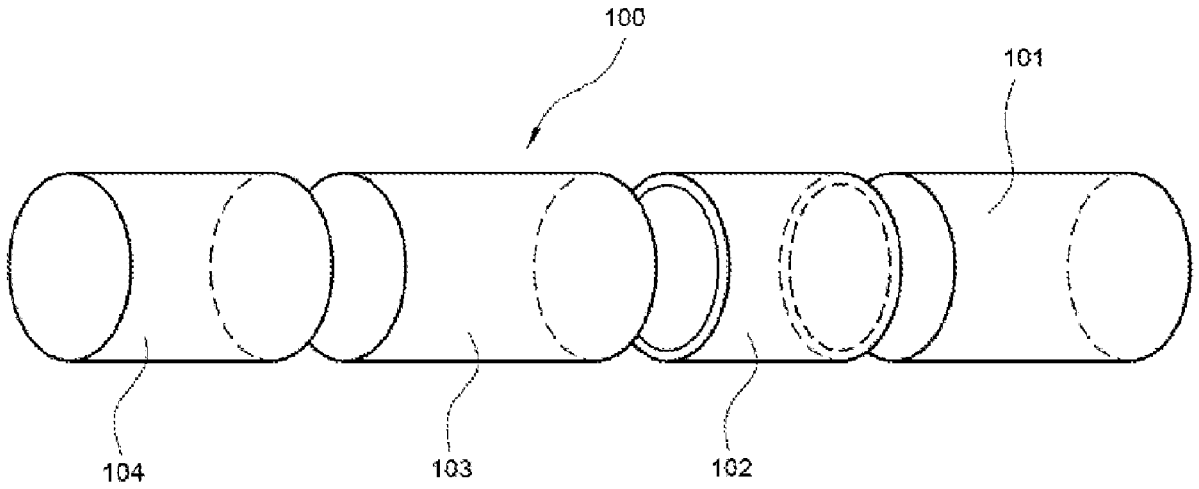
**Publication Classification**

(51) **Int. Cl.**
***A24D 3/06*** (2006.01)
***A24D 3/02*** (2006.01)
***A24D 3/04*** (2006.01)

(52) **U.S. Cl.**
CPC ..... ***A24D 3/068*** (2013.01); ***A24D 3/0212*** (2013.01); ***A24D 3/04*** (2013.01)

(57) **ABSTRACT**

An element for use in a smoking article, the element comprising a longitudinally extending core; wherein the longitudinally extending core comprises a filtering material; wherein the filtering material comprises a paper and/or other biodegradable material; and wherein the filtering material further comprising a hydrophobic material.



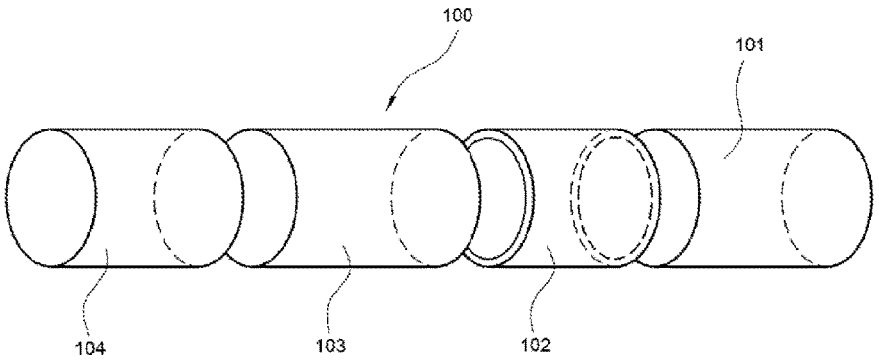



**Figure 1**

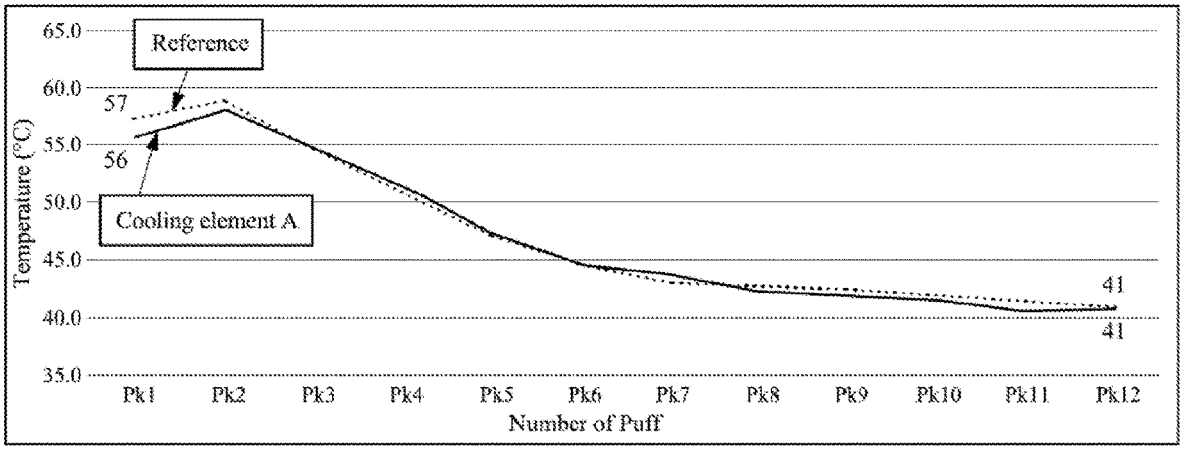



Figure 2

# A SUSTAINABLE SMOKING ARTICLE ELEMENT

## INTRODUCTION

**[0001]** The present invention provides a sustainable element for use with a smoking article such as a tobacco heating product or a heat-not-burn product.

## BACKGROUND

**[0002]** Tobacco heating products or heat-not-burn (HNB) products are well known. The idea of a tobacco heating product is that the tobacco is heated to a specific temperature (such as 350° C.) without burning. This delivers a vapour containing nicotine and it is believed that heating without burning avoids creation of combustion products that are harmful to the consumer.

**[0003]** Tobacco heating products or HNB products may include a plug of modified tobacco and other mouthpiece elements which are wrapped in a paper plugwrap so as to provide a cigarette-like appearance. In one such product a reconstituted tobacco plug, a wrapped hollow acetate tube, a wrapped plug of PLA [poly(lactic acid)] and a conventional wrapped acetate segment are wrapped in a white paper. The product may then be inserted into a heating element which heats the tobacco so the product can then be "smoked" by the consumer. The function of the "filter" in these products is very different from that of a cigarette filter; the main functions are to provide the look and feel of a cigarette and also to cool the vapour down to an acceptable temperature for the consumer. In the product described above it is the PLA section that performs the significant cooling function and so it may be considered a cooling element.

**[0004]** It is well known to use materials such as PLA for cooling elements. More recently it has become known to use cellulose acetate for cooling elements, as discussed in WO2021/074222.

**[0005]** However, cellulose acetate and PLA are not readily biodegradable. As a result, smoking article elements such as cellulose acetate containing filter elements and cooling elements may persist in the environment for many years. Due to this, and in consideration of new EU legislation coming into force by 2021 (aimed at reducing the use of single-use plastics such as cellulose acetate filters), there is increasing interest in smoking elements (such as cooling elements) that do not comprise single-use plastics and are readily biodegradable.

**[0006]** Consequently, there is a need for a smoking article element that provides acceptable cooling of the vapour in a HNB product and acceptable filtration properties while having an improved biodegradability to conventional materials such as cellulose acetate.

## SUMMARY OF THE INVENTION

**[0007]** According to the present invention there is provided an element for use in a smoking article (e.g., a cooling element for a tobacco heated product and/or HNB product) comprising a longitudinally extending (e.g., cylindrical, e.g., tubular) core; wherein the longitudinally extending (e.g., cylindrical, e.g., tubular) core comprises a filtering material; wherein the filtering material comprises a paper and/or other biodegradable material (e.g. non-cellulose acetate containing material), and further comprises a hydrophobic material. Preferably, the element is a cooling element.

**[0008]** It will be appreciated that the term "an element" as used herein refers to any discrete segment that can be used in a smoking article. The element may be a cooling element or a filtration element.

**[0009]** It will be appreciated that the term "cooling element" as used herein refers to a discrete segment which provides a significant cooling function i.e., lowering the temperature of the vapour as it passes along the length of the element.

**[0010]** The term "biodegradable" refers to the filtering material and element being able to exhibit a biodegradation of at least 90% after 6 months under controlled composting conditions (see ISO14855-1 Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions—Method by analysis of evolved carbon dioxide).

**[0011]** Preferably, the paper and/or other biodegradable material (e.g. non-cellulose acetate containing material) used in the filtering material of the element of the present invention is "readily biodegradable" and has an enhanced biodegradability compared to cellulose acetate. Therefore, the present invention provides an element of enhanced biodegradability, and thus is more environmentally friendly and is more in line with EU legislation.

**[0012]** The phrase "readily biodegradable" refers to the filtering material and element being able to disintegrate rapidly and completely biodegrade when immersed in water. Preferably the element has the 'Ready Biodegradability' level of biodegradability as measured according to OECD 301B 'Ready Biodegradability' method (modified Sturm test), which is well known in the art. The phase "readily biodegradable" will here be understood to mean 'Ready Biodegradability' level of biodegradability.

**[0013]** The applicants have surprisingly found that by including a hydrophobic material in the filtering material along with the paper and/or other biodegradable material (e.g. non-cellulose acetate containing material), the element is able to provide equivalent cooling and filtration performance to conventional PLA and cellulose acetate elements, while also providing improved biodegradability as discussed above. This is illustrated in the examples of the present application.

**[0014]** Without wanting to be bound by theory, it is thought that the hydrophobic material within the filtering material causes water vapour within the element (e.g. cooling element) to condense within the element (e.g. cooling element) which provides the beneficial effect of cooling the vapour as it passes through the element.

**[0015]** Preferably, the hydrophobic material is distributed throughout the longitudinally extending (e.g., cylindrical, e.g., tubular) core of the element. The applicants have found that this provides an optimal level of vapour cooling and filtration for use in a tobacco heating product or HNB product.

**[0016]** Preferably, the filtering material is a paper and/or other biodegradable material (e.g. non-cellulose acetate containing material) with a hydrophobic material coated thereon. Preferably, the coated paper and/or other biodegradable material (e.g. non-cellulose containing material) is arranged within the longitudinally extending (e.g., cylindrical, e.g., tubular) core such that the hydrophobic material is

(e.g. substantially evenly) distributed throughout the longitudinally extending core of the element.

**[0017]** The applicants have found that by using a paper and/or other biodegradable material (e.g. non-cellulose acetate material) coated in a hydrophobic material to form the element of the present invention, they are able to produce an element wherein the hydrophobic material is evenly distributed throughout the element. As discuss above, this provides an optimal level of vapour cooling and filtration for use in a tobacco heating product or HNB product.

**[0018]** The paper and/or other biodegradable material (e.g. non-cellulose acetate containing filtering material) is preferably readily biodegradable. The paper and/or other biodegradable material (e.g. non-cellulose acetate containing filtering material) may be comprised of any paper (in any form) which is conventionally used in filters or filter elements. The paper may be, for example, filtering paper, aperture paper, crepe paper, air-laid paper or machine glazed paper etc. of varying grades. The fibre of the paper and/or other biodegradable material (e.g. non-cellulose acetate containing filtering material) may be a natural fibre (e.g. flax, hemp, sisal, jute, abaca, cotton, coconut fibres, bamboo fibres, starch (e.g. from corn), or tobacco) or any roll material. The paper may be woven or non-woven, or in the form of a coherent web of paper, or a longitudinally corrugated and/or fibrillated web of paper e.g. gathered laterally into, and held, in plug form. The paper and/or other biodegradable material (e.g. non-cellulose acetate containing filtering material) may be in the form of a coherent web comprising a first paper and/or other biodegradable material (e.g. non-cellulose acetate containing filtering material) and a second paper and/or other biodegradable material (e.g. non-cellulose acetate containing filtering material). The paper and/or other biodegradable material (e.g. non-cellulose acetate containing filtering material) may be in the form of a blend of different paper materials and/or other biodegradable materials (e.g. non-cellulose acetate containing filtering materials). The paper filtering material may have the same or a similar structure to those papers sold under the trademark Myria® or Puracel® (of Essentra plc). The paper may be coated with a hydrophobic coating or hydrophobic material.

**[0019]** Preferably, the paper has a basis weight from 20 gsm to 200 gsm. For example, the paper may have a basis weight from 40 gsm to 180 gsm, e.g. from 60 gsm to 160 gsm, e.g. from 80 gsm to 140 gsm, e.g. from 100 gsm to 120 gsm, e.g. from 20 gsm to 60 gsm, e.g. from 30 gsm to 40 gsm.

**[0020]** The hydrophobic coating/material may be any suitable hydrophobic material. For example, the hydrophobic coating/material may a polymer or a blend of polymers. Preferably, the hydrophobic coating/material is a starch, such as a modified starch, for example oxidized starch (E1404). A starch such as a modified starch is preferred as it is inert and provides a non-plastic hydrophobic coating. The hydrophobic coating/material may be present in an amount from 0.01% to 50% weight of hydrophobic coating/material with respect to weight of the element (w/w), for example 0.01% to 20% w/w, for example 0.1% to 20% w/w, for example 5% to 20% w/w, for example 10% to 20% w/w, for example 0.1% to 10% w/w, for example 0.1% to 5% w/w, for example 0.5% to 2.5% w/w.

**[0021]** An element according to the present invention is manufactured by methods known in the art. For example, the paper element may be manufactured by embossing the sheet paper and then forming the embossed paper into a cylindrical core via machinery commonly used in the art.

**[0022]** A coated paper according to the present invention is manufactured by methods known in the art. The hydrophobic coating can be applied to the paper via any of the standard coating methods known in the art.

**[0023]** Preferably the length of the element is from 5 to 50 mm (e.g., from 10 to 30 mm, e.g., 8 to 24 mm, e.g., 15 to 20 mm, e.g., 18 mm).

**[0024]** Preferably the circumference of the element is from 12 to 30 mm (e.g., 15 to 28 mm), more preferably from 17 to 25 mm, (e.g., 18 to 25 mm, e.g., 20 to 24 mm, e.g., 22 to 24 mm, e.g., 23 mm, e.g., 22 mm).

**[0025]** Preferably the longitudinally extending (e.g., cylindrical, e.g., tubular) core is of uniform axial cross section (e.g., circular, e.g., annular).

**[0026]** Preferably the element (e.g., a cooling element for a tobacco heating product and/or HNB product) has a substantially circular cross section meaning the element is substantially cylindrical in shape. However, the element of the present invention may be any shape. For example, the element may have an annular cross section or an oval cross section or a square cross section or a rectangular cross section.

**[0027]** The element (e.g., the cooling element for a tobacco heating product and/or HNB product) may further comprise an outer wrapper engaged around the longitudinally extending (e.g., cylindrical, e.g., tubular) core. The outer wrapper may be a paper (e.g., plugwrap), preferably a paper (e.g., plugwrap) of basis weight 20 to 160 gsm, for example a paper (e.g., plugwrap) of basis weight 24 to 150 gsm, for example a paper (e.g., plugwrap) of basis weight 70 to 150 gsm, for example a paper (e.g., plugwrap) of basis weight 70 to 140 gsm.

**[0028]** The longitudinally extending (e.g., cylindrical, e.g., tubular) core may have one, or a plurality of, longitudinally extending bore(s) (or hole(s)). The one or plurality of longitudinally extending bore(s) (or hole(s)) may extend longitudinally through the full length of the longitudinally extending core (and may be open at one or both ends of the core).

**[0029]** The longitudinally extending (e.g., cylindrical, e.g., tubular) core may have a profiled outer surface including a plurality of (e.g., longitudinally extending) (e.g., C-shaped or U-shaped) grooves or channels. The plurality of (e.g., longitudinally extending) (e.g., C-shaped or U-shaped) grooves or channels may extend the full length of the (outer surface of the) longitudinally extending core. The plurality of (e.g., longitudinally extending) (e.g., C-shaped or U-shaped) grooves or channels may not extend the full length of the (outer surface of the) longitudinally extending core.

**[0030]** The longitudinally extending (e.g., cylindrical, e.g., tubular) core may have one, or a plurality of, longitudinally extending bore(s) (or hole(s)) and may have a profiled outer surface including a plurality of (e.g., longitudinally extending) (e.g., C-shaped or U-shaped) grooves or channels.

**[0031]** According to the present invention in a further aspect there is provided an element for a tobacco heating product and/or HNB product comprising a longitudinally extending (e.g., cylindrical, e.g., tubular) core; wherein the longitudinally extending (e.g., cylindrical, e.g., tubular) core

comprises a filtering material; wherein the filtering material comprises a paper and/or other biodegradable material (e.g. non-cellulose acetate containing material); and wherein the filtering material further comprising a hydrophobic material. Preferably, the element is a cooling element.

**[0032]** According to the present invention in a further aspect there is provided a smoking article (e.g., tobacco heating product, HNB product) comprising an element. The element comprising a longitudinally extending (e.g., cylindrical, e.g., tubular) core; wherein the longitudinally extending (e.g., cylindrical, e.g., tubular) core comprises a filtering material; wherein the filtering material comprises a paper and/or other biodegradable material (e.g. non-cellulose acetate containing material); and wherein the filtering material further comprising a hydrophobic material. Preferably, the element is a cooling element. Optionally the smoking article may comprise one or more discrete further segments.

**[0033]** According to the present invention there is provided a tobacco heating product and/or HNB product comprising an element. The element comprising a longitudinally extending (e.g., cylindrical, e.g., tubular) core; wherein the longitudinally extending (e.g., cylindrical, e.g., tubular) core comprises a filtering material; wherein the filtering material comprises a paper and/or other biodegradable material (e.g. non-cellulose acetate containing material); and wherein the filtering material further comprising a hydrophobic material. Preferably, the element is a cooling element. Optionally the tobacco heating product and/or HNB product may comprise one or more discrete further segments.

**[0034]** According to the present invention there is provided the use, in a tobacco heated product and/or HNB product, of an element. The element comprising a longitudinally extending (e.g., cylindrical, e.g., tubular) core; wherein the longitudinally extending (e.g., cylindrical, e.g., tubular) core comprises a filtering material; wherein the filtering material comprises a paper and/or other biodegradable material (e.g. non-cellulose acetate containing material); and wherein the filtering material further comprising a hydrophobic material. Preferably, the element is a cooling element. Optionally the tobacco heating product and/or HNB product may comprise one or more discrete further segments.

**[0035]** Preferably, the paper and/or other biodegradable material (e.g. non-cellulose acetate containing material) used in the filtering material of an element for a smoking article (e.g., tobacco heating product, HNB product) according to the present invention is readily biodegradable and has an enhanced biodegradability compared to cellulose acetate. Therefore, the present invention provides an element of enhanced biodegradability, and thus is more environmentally friendly and is more in line with EU legislation.

**[0036]** The phrase "readily biodegradable" refers to the element being able to disintegrate rapidly and completely biodegrade when immersed in water. Preferably the element has the 'Ready Biodegradability' level of biodegradability as measured according to OECD 301B 'Ready Biodegradability' method (modified Sturm test), which is well known in the art. The phase "readily biodegradable" will here be understood to mean 'Ready Biodegradability' level of biodegradability.

**[0037]** The applicants have surprisingly found that by including a hydrophobic material in the filtering material along with the paper and/or other biodegradable material (e.g. non-cellulose acetate containing material), the element is able to provide equivalent cooling and filtration performance to conventional PLA and cellulose acetate elements, while also providing improved biodegradability as discussed above. This is illustrated in the examples of the present application.

**[0038]** Without wanting to be bound by theory, it is thought that the hydrophobic material within the filtering material causes water vapour within the element (e.g. cooling element) to condense within the element (e.g. cooling element) which provides the beneficial effect of cooling the vapour as it passes through the element.

**[0039]** Preferably, the hydrophobic material is distributed throughout the longitudinally extending (e.g., cylindrical, e.g., tubular) core of the element. The applicants have found that this provides an optimal level of vapour cooling and filtration for use in a tobacco heating product or HNB product.

**[0040]** Preferably, the filtering material is a paper and/or other biodegradable material (e.g. non-cellulose acetate containing material) with a hydrophobic material coated thereon. Preferably, the coated paper and/or other biodegradable material (e.g. non-cellulose containing material) is arranged within the longitudinally extending (e.g., cylindrical, e.g., tubular) core such that the hydrophobic material is (e.g. substantially evenly) distributed throughout the longitudinally extending core of the element.

**[0041]** The applicants have found that by using a paper and/or other biodegradable material (e.g. non-cellulose acetate material) coated in a hydrophobic material to form the element of the present invention, they are able to produce an element wherein the hydrophobic material is evenly distributed throughout the element. As discuss above, this provides an optimal level of vapour cooling and filtration for use in a tobacco heating product or HNB product.

**[0042]** Preferably the tobacco heating product and/or HNB product according to the present invention further comprises one or more discrete further segments (e.g., of a HNB mouthpiece). The discrete further segments may be (e.g., cylindrical) plugs of tobacco smoke filtering material (e.g., cellulose acetate tow), a (e.g., cylindrical) rod of tobacco (e.g., any form of tobacco (including reconstituted tobacco)), hollow (e.g., acetate) tubes etc.

**[0043]** It will be appreciated that the element may be used in any multi-segment filter or consumable. The filter construction could be two, three, four or more discrete segments. The discrete further segments may be (e.g., cylindrical) plugs of tobacco smoke filtering material (e.g., cellulose acetate tow) and/or a hollow (e.g., acetate) tube filter. The multi-segment filter may be attached to a tobacco rod (which can be made from any form of tobacco (including reconstituted)). The multi-segment filter may include other filter segments that include capsule containing filters, carbon containing filters, CPS filters, tube filters, acetate filters, paper filters, menthol containing filters etc.

**[0044]** According to the present invention there is further provided a smoking article (e.g., tobacco heating product, HNB product) comprising a multi-segment filter attached to a tobacco rod. The multi-segment filter may comprise a cooling element according to the present invention. The multi-segment filter may further comprise a plug filter comprising a longitudinally extending core of cellulose acetate tow. The multi-segment filter may further comprise a hollow acetate tube filter.

**[0045]** The present invention will now be described in further detail by reference to the attached Figures in which:

**[0046]** FIG. **1** shows a schematic view of a HNB product according to the invention which includes a cooling element according to an embodiment of the invention;

**[0047]** FIG. **2** is a graphical representation of how the temperature at the mouth end of a HNB product varies as puffs are taken when the HNB product contains cooling element A according to the present invention in comparison with a reference HNB product, Amber HEETS.

**[0048]** FIG. **1** illustrates a schematic view of a cylindrical HNB product **100**. The HNB product **100** comprises four segments: a cylindrical plug **101** of reconstituted tobacco; a hollow acetate tube **102**; a cylindrical cooling element **103** according to an embodiment of the present invention; and a cylindrical plug of cellulose acetate tow **104**. Plug **101** of reconstituted tobacco is 12 mm long and has a circumference of 22 mm, and forms one end of the HNB product **100**. This is the end inserted in a HNB device. Such plugs of reconstituted tobacco are well known in the art. This plug is heated in use by a heating device (HNB device) to produce a vapour, as is well known in the art. The plug **101** of reconstituted tobacco is abutted at one end to a 8 mm long hollow acetate tube **102** which is also of circumference 22 mm and has wall thickness 1.3 mm. The end of the hollow acetate tube **102** opposite to the plug of reconstituted tobacco **101** is abutted to a 18 mm long cylindrical cooling element **103** according to an embodiment of the present invention. The cylindrical cooling element **103** has a circumference of 22 mm. The cylindrical cooling element **103** is made of paper coated in oxidised starch R1404. The paper contains the following components:

| GROUP | COMPONENT | CHEMICAL NAME |
|---|---|---|
| FIBRES | pulp | pulp, cellulose |
| FILLERS | calcium carbonate | carbonic acid calcium salt (1:1), precipitated, EC No.: E 170 |
| ADDITIVES | modified starch | starch, oxidized, E1404 |
| PROCESSING AIDS | cationic guar gum | guar gum, 2-hydroxy-3-(trimethylammonio)propyl ether, chloride |
| | cationic starch | starch, 2-hydroxy-3-(trimethylammonio)propyl ether, chloride |

**[0049]** A cylindrical plug of cellulose acetate tow **104** of length 7 mm and circumference 22 mm is abutted to the opposite end of the cooling element **103** such that cooling element **103** is positioned in between cylindrical plug of cellulose acetate tow **104** and the hollow acetate tube **102**.

**[0050]** The cylindrical plug of reconstituted tobacco **101**, hollow acetate tube **102**, cylindrical cooling element **103** and cylindrical plug of cellulose acetate tow **104** are further wrapped with a plugwrap (not shown) of conventional plugwrap paper (that is known in the art). This provides an external appearance similar to that of a conventional cigarette.

**[0051]** During use, the cylindrical plug of reconstituted tobacco **101** of the HNB product **100** is inserted into a HNB device. The HNB device heats the reconstituted tobacco in the manner conventional for HNB devices. This produces a hot vapour which is first drawn through the hollow acetate tube **102** and then through the cylindrical cooling element **103** and then finally through cylindrical plug of cellulose acetate tow **104** to the smoker's mouth (i.e., the mouth end). It is believe that drawing this hot vapour through the cooling element **103** cools the vapour down to a temperature that is acceptable for the user. The applicants have found that the inclusion of a hydrophobic material such as oxidised starch in the paper means the cooling element provides equivalent cooling and filtration performance to conventional cellulose acetate cooling element, while also providing improved biodegradability.

## Example 1

**[0052]** In FIG. **1**, cylindrical cooling element **103** of length 18 mm and circumference 22 mm is made of paper coated in oxidised starch R1404. The paper cooling element **103** is made according to methods known in the art. This is cooling element A according to the present invention.

## EXPERIMENT

**[0053]** A HNB product, according to FIG. **1**, was assembled for testing, including cooling element A according to the present invention. Cooling element A was used with a hollow acetate tube (**102** in FIG. **1**) of circumference 22 mm and wall thickness 1.3 mm and with a cylindrical plug of cellulose acetate tow (**104** in FIG. **1**). The reference HNB product Amber HEETS includes a plug of reconstituted tobacco, a hollow acetate tube, a PLA cooling element, herein referred to as a "conventional cooling element", and a cylindrical plug of cellulose acetate tow in an analogous arrangement to that shown in FIG. **1**.

**[0054]** The HNB product including cooling element A and the reference HNB product Amber HEETS were tested in conventional heating devices (HNB devices).

**[0055]** Each HNB product was inserted into a heating device. The mouth end of the HNB product was inserted into a smoking machine which is configured to smoke the HNB product. An IR camera was used to analyse the temperature at the mouth end of the HNB product while it was being smoked. The smoking machine was configured to take a puff on the HNB product every 30 seconds, each puff being 2 seconds long. The temperature at the mouth end of the HNB product was measured for each puff. The experiment was performed at standard room temperature and humidity. The experiment was repeated for each HNB product i.e. the one containing the cooling element A according to the invention, and the reference product containing a PLA cooling element.

**[0056]** FIG. **2** illustrates the temperature at the mouth end for each puff for the HNB product comprising cooling element A in comparison with the reference HNB product Amber HEETS. The Figure shows that paper based cooling element A of the present invention is capable of providing a cooling effect that is equivalent to conventional cooling elements, while providing the huge benefit of being readily biodegradable.

**[0057]** The temperature change and nicotine yields of the HNB product comprising cooling element A and the reference HNB product Amber HEETS in conventional heating devices (HNB devices) were measured by methods well known in the art (ISO 3308:2012 Routine analytical cigarette-smoking machine—Definitions and standard conditions). The results are illustrated in Table 1.

TABLE 1

| | HNB Product | |
|---|---|---|
| | Cooling element A | Amber HEETS reference |
| PD (mmWG) | 50 | 55 |
| 1st Puff Temp (° C.) | 56 | 57 |
| $12^{th}$ Puff Temp (° C.) | 41 | 41 |
| ΔT (° C.) | 15 | 16 |
| Nicotine yield (mg) | 1.2 | 1.11 |

**[0058]** Table 1 shows that the paper cooling element A according to the present invention provides equivalent cooling and filtration performance to conventional cooling elements, while also providing improved biodegradability.

**1**. An element for use in a smoking article,

the element comprising a longitudinally extending core;

wherein the longitudinally extending core comprises a filtering material;

wherein the filtering material comprises a paper and/or other biodegradable material; and

wherein the filtering material further comprising a hydrophobic material.

**2**. The element according to claim **1**, wherein the element is a cooling element.

**3**. The element according to claim **1**, wherein the paper and/or other biodegradable material is readily biodegradable.

**4**. The element according to claim **1**, wherein the hydrophobic material is distributed throughout the longitudinally extending core of the element.

**5**. The element according to claim **1**, wherein the filtering material is a paper and/or other biodegradable material with a hydrophobic material coated thereon.

**6**. The element according to claim **5**, wherein the coated paper and/or other biodegradable material is arranged within the longitudinally extending core such that the hydrophobic material is distributed throughout the longitudinally extending core of the element.

**7**. The element according to claim **1**, wherein the longitudinally extending core has one, or a plurality of, longitudinally extending bore(s).

**8**. The element according to claim **1**, wherein the length of the element is from 5 to 50 mm, e.g., 10 to 30 mm, e.g., 8 to 24 mm, e.g., 15 to 20 mm, e.g., 18 mm.

**9**. The element according to claim **1**, wherein the circumference of the element is from 12 mm to 30 mm, e.g., 15 mm to 28 mm, e.g., 17 mm to 25 mm.

**10**. The element according to claim **1**, wherein the longitudinally extending core has a profiled outer surface including a plurality of grooves or channels.

**11**. The element according to claim **1**, wherein the longitudinally extending core has a profiled outer surface including a plurality of grooves or channels and has one, or a plurality of, longitudinally extending bore(s).

**12**. A smoking article (e.g., tobacco heating product, HNB product) comprising an element according to claim **1** and optionally one or more discrete further segments.

**13**. A tobacco heating product and/or HNB product comprising an element according to claim **1** and optionally one or more discrete further segments.

**14**. The use, in a tobacco heated product and/or HNB product, of an element according to claim **1**.

* * * * *