uniformity. The deaeration of cast film involves the pulling of vacuum over the wet mixture and the inclusion of various types of deaerators like simethicone etc. Simply put, in cast film, mixing may introduce air in the aqueous mix in cast film and vacuum and deaerating agents may be used to remove it and preserve uniformity. See, Fuisz et al. US 20080075825 A1. In our extruded, non aqueous film this hazard is not present.

Many of the above observations concerning aqueous wet casting apply equally to wet casting that employs non-water solvents.

Extruded edible products have a lengthy history – confections were being extruded in the 1920's (See P.B. Laskey US 1,492,600). Extrusion has more recently been used in medical device manufacture and in the making of transdermal drug delivery systems – of course, these are both non-edible and insoluble. See, generally, *Pharmaceutical Extrusion Technology*, edited by Issac Ghebre-Sellassie and Charles Martin (2007)~~, the content of which is incorporated herein in its entirety~~.

Inspired by the success of transdermal drug delivery systems, work began to extrude soluble, edible sheets and films for drug delivery use.

Schiraldi et al. (US RE33,093) discloses bioadhesive monolayer extruded films, under 10 mils, composed of principally of polyethylene oxide together with a lesser amount of HPC, a water insoluble polymer, a plasticizer and a medicament. See also Mooney and Schiraldi, US 6,072,100 disclosing compositions extruded films and sheets comprising a composition of PEO or HPC, a water polymer derived from a carboxylic aid, 30-80% plasticizer and up to 10% of a medicament.

Michael Repka and James McGinnity disclose hot melt extruded sheets with a thickness of 10-13 mils using a 50-50 ratio PEO and HPC, together with 3% of Vitamin E TPGS (see "Influence of Vitamin E TPGS on the properties of hydrophilic films produced by hot melt extrusion," International Journal of Pharmaceutics 202 (2000) 63-70).

Repka et al US 6,375,963 issued April 23, 2002 disclose a hot-melt extruded film and method of preparation thereof. The inventors note that "[f]ilms comprising pure hydroxypropylcellulose (HPC) and other water-soluble or water-swellable polymers cannot be readily produced by hot-melt extrusion due to the high stress that is exhibited on the extruder. Therefore plasticizers

of nano sized active and also controlled release (depending on the strength of the bond with the exchange resin).

The present invention can be used to taste mask pharmaceuticals (including botanicals) in all major therapeutic categories should they require taste masking. Also in all major therapeutic categories, molecular or nano sized active may be desirable for more efficient uptake. In addition, the present invention provides sustained release for a given compound. Finally, the invention allows for side effect minimization by virtue principally of being able to use a lower dosage.

Ion exchange resins preferred for use in the sheets of the invention are water-insoluble and consist of a pharmacologically inert organic or inorganic matrix containing covalently bound functional groups that are ionic or capable of being ionized under the appropriate conditions of pH. The organic matrix may be synthetic (e.g., polymers or copolymers of acrylic acid, methacrylic acid, sulfonated styrene, sulfonated divinylbenzene), or partially synthetic (e.g., modified cellulose and dextrans). The inorganic matrix can also be, e.g., silica gel modified by the addition of ionic groups. The covalently bound ionic groups may be strongly acidic (e.g., sulfonic acid), weakly acidic (e.g., carboxylic acid), strongly basic (e.g., quaternary ammonium), weakly basic (e.g., primary amine), or a combination of acidic and basic groups. In general, those types of ion exchangers suitable for use in ion exchange chromatography and for such applications as deionization of water are suitable for use in these controlled release drug preparations. Such ion exchangers may be but are not limited to those described by H. F. Walton in "Principles of Ion Exchange", ~~the entire contents of which are incorporated herein by reference,~~ (pp. 312- 343). The ion exchange resins useful in the present invention have exchange capacities below about 6 milli-equivalents per gram (meq/g) and preferably below about 5.5 meq/g.

The resin is crosslinked with a crosslinking agent selected from difunctional compounds capable of crosslinking polystyrenes; these are commonly known in the art. Preferably, the crosslinking agent is a divinyl or polyvinyl compound. Most preferably the crosslinking agent is divinylbenzene. The resin is crosslinked to an extent of about 3 to about 20%, preferably about 4 to about 16%, more preferably about 6 to about 10%, and most preferably

Extruder: Randcastle Taskmaster 1000 triple vented 36/1 LD with triple elongated patented screw

Slab exit: Randcastle 6 inch flexible lip die with 2 inch chill roll and torque winder

Example A

The following ingredients were mixed in a dry blend, using multiple batches in a Hamilton 8 cup Hamilton Beach/Cuisinart style food processor for a total quantity of 10 kg's.

Ingredient	%	Supplier
HPC LF	58.75	Aqualon (Hercules)
Propylene Glycol FCC, NF	3	Spectrum
Xylitol NF	5.25	Roquette
Bitter Masker	2	Ungerer
Sucralose	2	Tate & Lyle
Snuff	25	Bruton
Peppermint Flavor	2	Ungerer
TiO2	2	DNP International
Total	100	

The dry blend was fed into a single screw extruder (L/D ration 36) with rpm set at 180 and a barrel temperature set at 110°C (230 F) for the initial zone and 150°C (300 F) for subsequent zones and the slot die. The extruder was fed at a rate of 7 kg of material per hour. The liquid base of the flavor was vented from the extruder. The slot die was set at 0.76 mm (30 mils). The slot die had a width of 25 cm (ten inches). The sheet was extruded with the take off rollers and showed a thickness of 0.33 mm (13 mils) and was rolled onto a roller without the use of any backing materials. Residence time of the material in the extruder was approximately ninety seconds. Thickness was measured and determined to be uniform across the web and through the roll.

The sheet was flexible and robust. Pieces were cut into dimensions of 2.5 cm by 2.5 cm (1 in. by 1 in). The pieces could be bent 180 degrees without breaking. These pieces were folded and placed in the upper gum and showed a dissolution time of 12-25 minutes. When placed in the lower gum, where greater saliva is

present, they folded samples showed a dissolution time of 8-15 minutes. The long period of dissolution resulted in a distinct minty breath for a long period. This far exceeded the lasting effect of traditional cast thin film and cast film breath fresheners. It was observed that the composition of this example, but without tobacco, would be highly useful as a long lasting breath freshener.

Example B

The following ingredients were mixed in a dry blend, using multiple batches in a Hamilton 8 cup Hamilton Beach/Cuisinart style food processor for a total quantity of 3 kgs.

Ingredient	%	Supplier
HPC ELF	56	Aqualon (Hercules)
Xylitol NF	5.5	Roquette Maltisorb P200
Bitter Masker	3	Ungerer
Sucralose	2.5	Tate & Lyle
Dextromethorphan-ion exchange resinate (46.9% Dextromethorphan/53.1 % Polacrilex Resin)	11.25	Cambrex
Ca Silicate	6	J M Huber
Ca Co3	11	Specialty Minerals
Cherry Flavor	2	Ungerer
Red	.75	Keystone Red # 40
TiO2	2	DNP International
Total	100	

The dry blend was fed into a single screw extruder (L/D ration 36) with rpm set at 180 and a barrel temperature set at 70°C (160 F) for the initial zone and subsequent zones and the slot die increasing to 115°C (240F). The extruder was fed at a rate of 7 kg of material per hour. The liquid base of the flavor was vented from the extruder. The slot die was set at 0.76 mm (30 mils). The slot die had a width of 25 cm (ten inches). The sheet was extruded with the take off rollers and showed a

thickness of 0.38 mm (15 mils) and was rolled onto a roller without the use of any backing materials. Residence time of the material in the extruder was approximately ninety seconds. Thickness was measured and determined to be uniform across the web and through the roll.

The sheet was flexible and robust. Pieces were cut and could repeatedly be bent 180 degrees without breaking. These pieces were sampled by 4 healthy volunteers and each volunteer reported that the taste was excellent - thereby confirming that the integrity of the resinate bond was maintained through the extrusion process.

The drug/resinate particles were observed in the final sheet, with their appearance unchanged by the process. These pieces were placed unseparated into a container and were observed to maintain separation of one piece from another (i.e. not sticking); nor was tack observed in the roll stock.

Example C

The following ingredients were mixed in a dry blend, using multiple batches in a Hamilton 8 cup Hamilton Beach/Cuisinart style food processor for a total quantity of 4 kgs

Ingredient	%	Supplier
HPC ELF	54	Aqualon (Hercules)
Xylitol NF	5	Roquette Maltisorb P200
Bitter Masker	1.5	Ungerer
Sucralose	2	Tate & Lyle
Phenylephrine-ion exchange resinate (41.4% Phenylephrine/51.6% Sodium Polystyrene Sulfonate resin)	16	Cambrex
Ca Silicate	4	J M Huber
Ca Co3	11	Specialty Minerals
Peppermint	1.5	Ungerer

TiO2	2	DNP International
Total	100	

The dry blend was fed into a single screw extruder (L/D ration 36) with rpm set at 180 and a barrel temperature set at 70°C (160 F) for the initial zone and subsequent zones and the slot die increasing to a maximum of 115°C (240 F). The extruder was fed at a rate of 7 kg of material per hour. The liquid base of the flavor was vented from the extruder. The slot die was set at 0.76 mm (30 mils). The slot die had a width of 25 cm (ten inches). The sheet was extruded with the take off rollers and showed a thickness of 0.4 mm (16 mils) and was rolled onto a roller without the use of any backing materials. Residence time of the material in the extruder was approximately ninety seconds. Thickness was measured and determined to be uniform across the web and through the roll.

The sheet was flexible and robust. Pieces were cut and could repeatedly be bent 180 degrees without breaking.

These pieces were sampled by 4 healthy volunteers and each volunteer reported that the taste was excellent - thereby confirming that the integrity of the resinate bond was maintained through the extrusion process. The drug/resinate particles were observed in the final sheet, with their appearance unchanged by the process. Dissolution time was approximately 20+ minutes with good buccal adhesion. These pieces were placed unseparated into a container and were observed to maintain separation of one piece from another (i.e. not sticking), nor was tack observed in the roll stock.

Example D

The following ingredients were mixed in a dry blend, using multiple batches in a Hamilton 8 cup Hamilton Beach/Cuisinart style food processor for a total quantity of 4 kgs.

Ingredient	%	Supplier
HPC ELF	54	Aqualon (Hercules)
Xylitol NF	5	Roquette Maltisorb P200
Bitter Masker	2	Ungerer

Sucralose	2	Tate & Lyle
Dextromethorphan-ion exchange resinate (46.9% Dextromethorphan/53.1 % Polacrilex Resin)	23	Cambrex
Ca Silicate	4	J M Huber
Ca Co3	5.25	Specialty Minerals
Cherry Flavor	2	Tobacco Technology
Red	.75	Keystone Red # 40
TiO2	2	DNP International
Total	100	

The dry blend was fed into a single screw extruder (L/D ration 36) with rpm set at 180 and a barrel temperature set at 70°C (160 F) for the initial zone and subsequent zones and the slot die increasing to a maximum of 115°C (240 F). The extruder was fed at a rate of 7 kg of material per hour. The liquid base of the flavor was vented from the extruder. The slot die was set at 0.76 mm (30 mils). The slot die had a width of 25 cm (ten inches). The sheet was extruded with the take off rollers and showed a thickness of 0.4 mm (16 mils) and was rolled onto a roller without the use of any backing materials. Residence time of the material in the extruder was approximately ninety seconds. Thickness was measured and determined to be uniform across the web and through the roll.

The sheet was flexible and robust. Pieces were cut and could repeatedly be bent 180 degrees without breaking.

These pieces were sampled by 4 healthy volunteers and each volunteer reported that the taste was excellent - thereby confirming that the integrity of the resinate bond was maintained through the extrusion process. The drug/resinate particles were observed in the final sheet, with their appearance unchanged by the process. Dissolution time was approximately 20+ minutes with good buccal adhesion. These pieces were placed unseparated into a container and were observed to maintain separation of

one piece from another (i.e. not sticking), nor was tack observed in the roll stock.

Example E

The following ingredients were mixed in a dry blend, using multiple batches in a Hamilton 8 cup Hamilton Beach/Cuisinart style food processor for a total quantity of 8 kgs

Ingredient	%	Supplier
HPC ELF	54	Aqualon (Hercules)
Xylitol NF	5	Roquette Maltisorb P200
Bitter Masker	1.5	Ungerer
Sucralose	2	Tate & Lyle
Chitosan	25	
Ca Silicate	2	J M Huber
Ca Co3	7	Specialty Minerals
Peppermint	2	Ungerer
TiO2	2	DNP International
Total	100	

The product was extruded in accordance with the process described in Example B. This resulted in a very nice roll of chitosan sheet that was cut to various sized pieces. The product has uses for systemic use and for wound care (obviously for which the flavor would be omitted). Product was 0.4 mm (16 mils) thick.

Example F

The following ingredients were mixed in a dry blend, using multiple batches in a Hamilton 8 cup Hamilton Beach/Cuisinart style food processor for a total quantity of 5 kgs.

Ingredient	%	Supplier
HPC ELF	52	Aqualon (Hercules)
Xylitol NF	5.25	Roquette Maltisorb P200
Sucralose	2	Tate & Lyle
Benzocaine USP	5	Changzhou Sunlight

Corn starch	31	Argo
Red # 40	.75	Colorcon
Cherry	2	Ungerer
TiO2	2	DNP International
Total	100	

The product was extruded in accordance with the process of the example B and the web was found to be uniform at 0.38 mm (15 mils) thickness. Two hundred twenty mg pieces were cut from the web using a die cut punch. Four healthy volunteers tested the product both on the tongue to release active on the throat and in the buccal cavity. Numbing effect was perceived very strongly and the product lasted for twenty to thirty minutes in the buccal cavity.

The product demonstrated a fairly high level of tackiness, and this was attributed to the tendency of benzocaine to act as a plasticizer. It was observed that a backing layer or dusting should be used to keep the product layers from adhering to one another in the roll stock.

Example G

The following ingredients were mixed in a dry blend, using multiple batches in a Hamilton 8 cup Hamilton Beach/Cuisinart style food processor for a total quantity of 5 kgs

Ingredient	%	Supplier
PEO 1105	5.5	Dow (Colorcon)
PEO N80	30.94	Dow (Colorcon)
PEO N10	13.75	Dow (Colorcon)
HPC LF	4.81	Aqualon
Maltitol	12.75	Roquette
Sucralose	2	Tate & Lyle
Tobacco	25	Bruton
Vitamin E TPGS	2	Eastman Chemical
Peppermint Flavor	2	Ungerer
Citric Acid NF CL-131	1	Spectrum

TiO_2	0.25	DNP International
Total	100	

The dry blend was fed into a single screw extruder (L/D ration 36) with rpm set at 180 and a barrel temperature set at 110°C (230 F) for the initial zone and 149°C (300 F) for subsequent zones and the slot die. The extruder was fed at a rate of 7 kg of material per hour. The liquid base of the flavor was vented from the extruder. The slot die was set at 0.76mm (30 mils). The slot die had a width of 25 cm (ten inches). The sheet was extruded with the take off rollers and showed a thickness of 0.3 mm (12 mils) and was rolled onto a roller without the use of any backing materials. Residence time of the material in the extruder was approximately ninety seconds.

Thickness was measured and determined to be uniform across the web and through the roll.

The sheet was flexible and robust. Pieces were cut into dimensions of 2.5 cm by 2.5 cm (1 in. by 1 in). The pieces could be bent 180 degrees without breaking. This formula demonstrated mucoadhesion.

Example H

The following ingredients were mixed in a dry blend, using multiple batches in a Hamilton 8 cup Hamilton Beach/Cuisinart style food processor for a total quantity of 10 kgs.

Ingredient	%	Supplier
HPC LF	53.75	Aqualon (Hercules)
Propylene Glycol FCC, NF	3	Spectrum
Xylitol NF	5.25	Roquette
Bitter Masker	2	Ungerer
Sucralose	2	Tate & Lyle
Tobacco	30	Bruton
Peppermint Flavor	2	Ungerer

TiO2	2	DNP International
Total	100	

The dry blend was fed into a single screw extruder (L/D ration 36) with rpm set at 180 and a barrel temperature set at 110°C (230 F) for the initial zone and 149°C (300 F) for subsequent zones and the slot die. The extruder was fed at a rate of 7 kg of material per hour. The liquid base of the flavor was vented from the extruder. The slot die was set at 0.76 mm (30 mils). The slot die had a width of 25 cm (ten inches). The sheet was extruded with the take off rollers and showed a thickness of 0.33 mm (13 mils) and was rolled onto a roller without the use of any backing materials. Residence time of the material in the extruder was approximately ninety seconds. Thickness was measured and determined to be uniform across the web and through the roll.

The sheet was flexible and robust. Pieces were cut into dimensions of 25 cm by 25 cm (1 in. by 1 in). The pieces could be bent 180 degrees without breaking. These pieces were folded and placed in the upper gum and showed a dissolution time of 12-25 minutes. When placed in the lower gum, where greater saliva is present, they folded samples showed a dissolution time of 8-15 minutes.

Example I

The following ingredients were mixed in a dry blend, using multiple batches in a Hamilton 8 cup Hamilton Beach/Cuisinart style food processor for a total quantity of 5 kg (11 lbs).

Ingredient	%	Supplier
HPC LF	59.25	Aqualon (Hercules)
Propylene Glycol FCC, NF	2	Spectrum
Xylitol NF	5.25	Roquette
Bitter Masker	2	Ungerer
Sucralose	2	Tate & Lyle
Tobacco	25	Bruton
Peppermint	2	Ungerer
TIO2	2	DNP

Glycerin	.5	Lognis
Total	100	

This composition was extruded in accordance with the process set forth in example A, and resulted in a similarly uniform product web. As expected, the reduction in glycerin reduced the tackiness of the resulting sheet.

Example J

The following ingredients were mixed in a dry blend, using multiple batches in a Hamilton 8 cup Hamilton Beach/Cuisinart style food processor for a total quantity of 2.7 kg (6 lbs).

Ingredient	%	Supplier
HPC ELF	61	Aqualon (Hercules)
Xylitol NF	6	Roquette
Bitter Masker	2	Ungerer
Sucralose	2	Tate & Lyle
Tobacco	25	Bruton
Peppermint Flavor	2	Ungerer
TiO2	2	DNP International
Total	100	

This composition was extruded in accordance with the process set forth in example A, and resulted in a similarly uniform product web. The removal of the plasticizer contained in other formulas, i.e. Propylene Glycol, did not adversely affect the flexibility and strength of the sheet. Samples were cut from the roll, and maintained their flexibility and strength over an observed period of sixty days. The absence of a plasticizer is desirable for stability (and lack of tackiness) in extreme climatic conditions.

Example K

The following ingredients were mixed in a dry blend, using multiple batches in a Hamilton 8 cup Hamilton Beach/Cuisinart style food processor for a total quantity of 2.7 kg (6 lbs).

Ingredient	%	Supplier
HPC LF	57	Aqualon (Hercules)
Xylitol NF	5	Roquette
Sucralose	2	Tate & Lyle
Starch	6.25	Argo
Tobacco	25	Bruton
Cherry	2	Ungerer
TIO2	2	DNP
Red #40	.75	Lognis
Total	100	

The dry blend was fed into a single screw extruder (L/D ration 36) with rpm set at 180 and a barrel temperature set at 127°C (260 F) for the initial zone and 127°C (260 F) for subsequent zones and the slot die. The extruder was fed at a rate of 7 kg of material per hour. Some of the liquid base volatiles of the flavor were vented from the extruder. The slot die was set at 0.76 mm (30 mils). The slot die had a width of ten inches The sheet was extruded with the take off rollers and showed a thickness of 0.33 mm (13 mils) and was rolled onto a roller without the use of any backing materials. Residence time of the material in the extruder was approximately ninety seconds. Thickness was measured and determined to be uniform across the web and through the roll.

The sheet was flexible and robust despite the absence of any traditional plasticizer in the composition. The roll was examined and it was perceived that the addition of starch to the composition served to further reduce tack. It was observed that silicate, too, could serve this role. The addition of starch and silicate was observed to be desirable to avoid tack in extreme climactic conditions.

Example L

Sheet from the Example K was cut and stacked in a plastic hockey puck style container. Bruton's snuff tobacco was sprinkled into the container.

The added lose tobacco was found to make the container deliciously aromatic when opened. Additionally, the container was exposed to extreme temperature and humidity with no observed tack of the sheet pieces. This

Example P

Tension/tear tests:

Samples from Example A were clipped an upper end into a heavy duty binder clip attached to a bottom hook of a Baker 0-11.3 kg (0-25 lb). spring scale and clipped at a lower end in another heavy duty binder clip. The heavy duty binder clip to which the bottom of the test sample was clipped was pulled slowly with gage set to 4.5 kg (10 lb). until failure (tear) of the sample product. A Listerine PocketPaks® Breath Strips (Cool Mint) (just purchased) failed at 0.2 kg (0.5 pounds), a Cough, Cold and Allergy strip produced by Monosol Rx, LLC failed at 0.11 kg (0.25 lbs), while a tobacco/NICOTINE sheet according to the present invention failed at 3.4 kg (7.5 lbs).

One of the main reasons these tension results are so important, is that a lack of tension strength, as shown in two of the sample comparative products, is very problematic in slitting and packaging. If the roll snaps, the manufacturing line comes to a stop. A proper product, such as that of the present invention, should have sufficient tear resistance to hold up under slitting and packaging.

Example Q

Bioavailability of Nicotine in Tobacco Buccal Sheet of the Present Invention vs. Bioavailability of Nicotine in Nulife Chewettes:

This example utilized sheets of Example A containing 75 mg of tobacco.

Nicotine absorption from smokeless tobacco is widely considered to be a critical component of tobacco satisfaction. Nicotine uptake from smokeless tobacco has been widely studied. Most public health experts believe that Swedish SNUS style smokeless tobacco provides the best nicotine absorption of the currently marketed smokeless tobacco products. "The relatively high nicotine delivery of Swedish snus is similar to a cigarette, and much higher than most existing nicotine replacement therapies including nicotine gum, lozenge, inhaler and nasal spray." (See "Is Low-nicotine Marlboro snus really snus," Jonathan Foulds and Helena Furberg, Harm Reduction Journal 2008 5:9).

Leading SNUS maker Swedish Match has incorporated a study of nicotine absorption performed by Erik Lunell and Marienne Lunell as part of its

The test was repeated with 500 mg of this Example P with insoluble polymer (polacrilex) and (125 mg. gum base):

2 minutes:	470 mg.
4 minutes:	370 mg.
5 minutes:	310 mg.
7 minutes:	275 mg.
10 minutes:	230 mg.

It is concluded that the insoluble polymer will lengthen the time for dissolution. It will also convey particulate unwanted taste. (Polacrilex is a highly purified crosslinked polyacrylic copolymer supplied in Hydrogen form. This polymer has the following technical characteristics:

Type of Resin:	Weak acid cation exchange resin
Matrix structure:	Crosslinked polyacrylic copolymer
Functional group:	Carboxylic
Physical form:	White to off-white fine free flowing powder
Ionic form:	Hydrogen
Particle size (US mesh):	+ 100 - 0%
	+ 200 - 15% max.
	- 200 - 85% min.
Total Exchange Capacity:	10.0 meq/dry gram (min)
Solubility:	Insoluble in all common solvents.)

Example S

Five pounds of the starting composition of Example A were mixed in the same method as example A. The same process conditions were used to extrude a sheet, except the die was full opened and the take off rollers were slowed down. This had the effect of increasing the thickness of the sheet to 0.64 mm (25 mils). It was observed that the composition could be made still thicker by an increase in the rpm of the screw from 180 rpm. One inch square pieces were cut and took approximately 45 minutes to dissolve. The roll was found to be flexible when made and after 90 days exposure to ambient conditions.

Example T

Roll stock made through the composition and process of Example A and was chipped up into small pieces using a conventional. Three pounds of the composition of Example A was then mixed, including 30% of the chipped

material. This new material was then extruded in accordance with the process parameters of Example A. The extruded roll stock was excellent and not distinguishable from the roll stock made in accordance with Example A. Thus, it was observed that the process of the present invention supports reuse of waste materials.

Example U

One pound of the starting composition of Example A was mixed by the same method as Example A. The mix was pressed between two pieces of aluminum foil. The foil sandwiched material was sandwiched between a hot plate at 163°C (325 Fahrenheit) and a hot iron, which was pressed down on the sandwich. The heat and pressure melted the composition into a sheet. The resulting sheet was uneven in thickness, with an average thickness of 0.76 mm (30 mils) and was flexible.

Example V

Samples of the extruded composition of Example A were sent to a validated, third party lab in order to test their nicotine concentration. The results were as follows:

	Matrix Code	**WT**	**WT**	**WT**	**WT**
	Sample ID	**082516**	**082516**	**082516**	**082516**
Tobacco Constituent	**Unit**	Average	Std. Dev.	L. Limit (95%)	U. Limit (95%)
Nicotine	(µg/g)	3846	154	3655	4038
Nornicotine	(µg/g)	NQ	NQ	N/A	N/A
Anabasine	(µg/g)	NQ	NQ	N/A	N/A
Myosmine	(µg/g)	BDL	BDL	N/A	N/A
Anatabine	(µg/g)	58.5	1.6	56.5	60.6

A review of these results demonstrates the excellent content uniformity of the pieces, as manifested in the standard deviation of nicotine concentration.

9. The nonaqueous, extrudable composition according to claim 1, further comprising a plasticizer.

10. The nonaqueous, extrudable composition according to claim 1, wherein the at least one thermoplastic polymer comprises a water soluble polymer.

11. The nonaqueous, extrudable composition according to claim 1, wherein the at least one thermoplastic polymer is contained in an amount up to 50 wt% of the whole composition.

12. The nonaqueous extrudable composition according to claim 1, wherein the bioactive agent includes chitosan.

13. A method for making a pharmaceutical product, comprising extruding a nonaqueous composition comprising at least one thermoplastic polymer in an amount of more than 20 wt% the whole composition, a bioactive agent other than tobacco and an ion exchange resin, the composition not containing polycarbophil, through an extruder to form an extruded sheet of the nonaqueous composition.

14. The method according to claim 13, wherein the extruded sheet has a thickness greater than 0.25 mm (10 mil).

15. The method according to claim 13, wherein the bioactive agent includes chitosan.

16. The method according to claim 13, wherein the at least one polymer comprises hydroxypropyl cellulose (HPC).

17. The method according to claim 13, wherein the composition is extruded at a temperature from 60°C to 120°C (140°F to 250°F) and for a time of less than 3 minutes, preferably less than 2 minutes and most preferably less than 90 seconds.

18. The method according to claim 13, wherein the nonaqueous composition further comprises flavoring.

19. The method according to claim 13, wherein the extruder is vented.

20. The method according to claim 13, the nonaqueous composition further comprises a plasticizer.

21. The method according to claim 13, further comprising cutting the extruded sheet to form a plurality of smaller sheets.

22. The method according to claim 13, wherein the sheet has a thickness greater than 0.25 mm (10 mils), preferably greater than 0.64 mm (25 mils).

23. The method according to claim 13, further comprising recycling any discarded portions of the extruded sheet to an inlet of the extruder.

24. The method according to claim 13, further comprising winding the extruded sheet about a roll to form a roll of the extruded sheet.

25. The method according to claim 13, further comprising controlling a thickness of the extruded sheet by monitoring the thickness of the extruded sheet using a thickness gauge, and controlling a feeder feeding the extruder and a pressure of a pump to pump the nonaqueous composition through a die on the basis of the monitored thickness.

26. The method according to claim 13, wherein the extruder is a single screw extruder.

27. The method according to claim 13, wherein the extruder is a double screw extruder with a pump to pump the nonaqueous composition through a die thereof at constant pressure.