

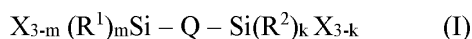
What is claimed is:

1. An inhaler comprising:

a valve having a valve volume of no more than 40 microliters (μL);

a valve coating on at least a portion of the valve, the coating comprising the
 5 condensation product of a first layer on the valve and a second layer on the first layer;
 the first layer comprising a silane having one or more reactive silane groups, and
 the second layer comprising a polyfluoropolyether silane;
 a pressurized canister in fluid communication with the valve, the pressurized canister
 containing a pharmaceutically acceptable inhalable composition that comprises
 10 a propellant; and
 albuterol, one or more pharmaceutically acceptable salts thereof, or one or more
 pharmaceutically acceptable hydrates of any of the foregoing,
 the albuterol, one or more pharmaceutically acceptable salts thereof, or one or
 more pharmaceutically acceptable hydrates of any of the foregoing being present in a
 15 concentration of 2 milligrams/milliliter (mg/mL) or greater.

2. The inhaler of claim 1, wherein the silane having one or more reactive silane groups comprises a compound of Formula (I)

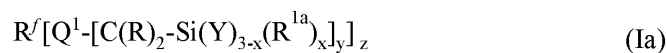


20 wherein R^1 and R^2 are independently selected from C1-C4 alkyl, X is a hydrolysable group or a hydroxy group, m and k are independently 0, 1, or 2 and Q is a divalent organic linking group.

3. The inhaler of claim 2, wherein Q comprises a substituted or unsubstituted C_2 to C_{12}
 25 hydrocarbyl chain, wherein the hydrocarbyl chain is optionally a substituted or unsubstituted C_2 to C_{12} alkyl chain.

4. The inhaler of any of the preceding claims, wherein the silane having one or more reactive silane groups comprises a mixture of two or more of 1,2- bis(trialkoxysilyl)
 30 ethane, 1,6- bis(trialkoxysilyl) hexane, 1,8- bis(trialkoxysilyl) octane, 1,4- bis(trialkoxysilylethyl)benzene, bis(trialkoxysilyl)itaconate, and 4,4'-bis(trialkoxysilyl)-1,1'-diphenyl.

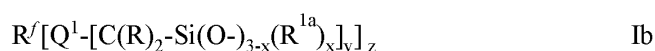
5. The inhaler of any of the preceding claims, wherein the perfluoropolyether silane is a compound of Formula I(a)



wherein:

- 5 R^f is a monovalent or multivalent polyfluoropolyether moiety;
 Q^1 is an organic divalent or trivalent linking group;
each R is independently hydrogen or a C1-4 alkyl group;
each Y is independently a hydrolysable group;
each R^{1a} is independently a C1-8 alkyl or phenyl group;
10 x is 0 or 1 or 2;
y is 1 or 2; and
z is 1, 2, 3, or 4.

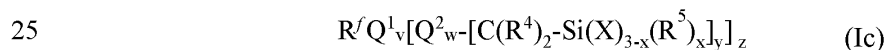
6. The inhaler of claim 5, wherein the compound of Formula (Ia) is a compound of
15 Formula (Ib)



wherein:

- R^f is a monovalent or multivalent polyfluoropolyether segment;
 Q^1 is an organic divalent or trivalent linking group;
20 each R is independently hydrogen or a C1-4 alkyl group; and
each R^{1a} is independently a C1-8 alkyl or phenyl group.

7. The inhaler of claims 5 or 6, wherein the compound of Formula (Ia) or Formula (Ib)
is a compound of Formula (Ic)



wherein:

- R^f is a polyfluoropolyether moiety;
 Q^1 is a trivalent linking group;
each Q^2 is an independently selected organic divalent or trivalent linking group;
30 each R^4 is independently hydrogen or a C₁₋₄ alkyl group;

each X is independently a hydrolysable or hydroxyl group;

R^5 is a C_{1-8} alkyl or phenyl group;

v and w are independently 0 or 1, x is 0 or 1 or 2; y is 1 or 2; and z is 2, 3, or 4.

5 8. The inhaler of any of claims 5 to 7, wherein each of x, y, and z of Formula (Ia), (Ib), or (Ic) are 1.

9 The inhaler of any of claims 5 to 8, wherein y of Formula (Ia), (Ib), or (Ic) is 0.

10 10. The inhaler of any of claims 5 to 9, wherein R^f may comprises perfluorinated repeating units selected from the group consisting of $-(C_nF_{2n}O)-$, $-(CF(Z)O)-$, $-(CF(Z)C_nF_{2n}O)-$, $-(C_nF_{2n}CF(Z)O)-$, $-(CF_2CF(Z)O)-$, and combinations thereof, wherein n is an integer from 1 to 6, and Z is a perfluoroalkyl group, an oxygen-containing perfluoroalkyl group, a perfluoroalkoxy group, or an oxygen-substituted perfluoroalkoxy group, each of which
15 can be linear, branched, or cyclic, and have 1 to 5 carbon atoms and up to 4 oxygen atoms when oxygen-containing or oxygen-substituted and wherein for repeating units including Z the number of carbon atoms in sequence is at most 6

20 11. The inhaler of any of claims 5 to 10 wherein n is an integer from 1 to 4, optionally 1 to 3, and further optionally 1 or 2.

12. The inhaler of any of claims 5 to 11 wherein Z is a perfluoroalkyl group, an oxygen-containing perfluoroalkyl group, a perfluoroalkoxy group, or an oxygen-substituted
25 perfluoroalkoxy group.

13. The inhaler of any of claims 5 to 11 wherein R^f is selected from the group consisting of $-CF_2O(CF_2O)_m(C_2F_4O)_pCF_2-$, $-CF(CF_3)O(CF(CF_3)CF_2O)_pCF(CF_3)-$, $-CF_2O(C_2F_4O)_p$

CF_2 -, $-(\text{CF}_2)_3\text{O}(\text{C}_4\text{F}_8\text{O})_p(\text{CF}_2)_3$ -, $-\text{CF}(\text{CF}_3)-(\text{OCF}_2\text{CF}(\text{CF}_3))_p\text{O}-\text{C}_t\text{F}_{2t}-\text{O}(\text{CF}(\text{CF}_3)\text{CF}_2$
 $\text{O})_p\text{CF}(\text{CF}_3)$ -, wherein t is 2, 3 or 4, m is 1 to 50, and p is 3 to 40.

12. The inhaler of any of the preceding claims, wherein the valve comprises a valve stem
 5 and the coating is disposed on at least a portion of the valve stem.

13. The inhaler of any of the preceding claims, wherein the albuterol, one or more
 pharmaceutically acceptable salts thereof, or one or more pharmaceutically acceptable
 hydrates of any of the foregoing is albuterol sulfate.

10
 14. The inhaler of any of the preceding claims, wherein albuterol is present in an
 concentration of 2.5 mg/mL or greater, optionally 3 mg/mL or greater, further optionally
 3.5 mg/mL or greater, still further optionally 3.75 mg/mL or greater, yet further optionally
 4 mg/mL or greater, or even further optionally 4.5 mg/mL or greater.

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 15. The inhaler of any of the preceding claims, wherein the valve volume is no more than
 35 μL , optionally no more than 30 μL , further optionally no more than 27.5 μL , or still
 further optionally about 25 μL .

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 16. The inhaler of any of the preceding claims further comprising an actuator that, when
 actuated, releases about 70 micrograms (μg) to about 140 μg , optionally about 80 μg to
 about 125 μg , further optionally about 90 μg to about 110 μg , still further optionally about
 95 μg to 105 μg , or yet still further optionally about 100 μg of albuterol from the inhaler.

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 17. The inhaler of any of the preceding claims, wherein the valve is a metered valve.

18. The inhaler of any of the preceding claims, further comprising a dose counter.

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 19. The inhaler of any of the preceding claims, wherein the propellant is HFC-134a.

20. A method of activating an inhaler of any of the preceding claims, the method
 comprising actuating an inhaler according to any of the preceding claims to release the

albuterol, one or more pharmaceutically acceptable salts thereof, or one or more pharmaceutically acceptable hydrates from the inhaler.