NICOTINE PARTICLES AND COMPOSITIONS

This disclosure relates to nicotine particles and compositions that are suitable for inhalation. These nicotine particles and compositions include nicotine, a sugar, and an amino acid.

Dry powder inhalers (DPI) are known and are used to treat respiratory diseases by delivering a dry powder comprising a pharmaceutically active compound, in aerosol form through inhalation to the patients' airways. In pharmaceutical dry powders, the active pharmaceutical ingredient (API) is usually agglomerated on the surface of larger carrier particles, such as lactose for example. DPI's operate complex mechanisms to ensure such agglomerates disperse, break up or disaggregate before the API is inhaled into the lungs.

It may be difficult to deliver nicotine particles to the lungs at inhalation at air flow rates that are within conventional smoking regime inhalation or air flow rates. Nicotine particles may have a tendency to agglomerate and stick to inhaler or processing surfaces, especially as a size of the nicotine particle deceases. Nicotine particles with an MMAD of less than about 10 micrometres tend to be increasingly thermodynamically unstable due to a high surface area to volume ratio, which provides an increasing surface free energy with this decreasing particle size, and consequently increases the tendency of particles to agglomerate and the strength of the agglomerate. Forming nicotine particles may be difficult and costly.

It would be desirable to provide nicotine particles and compositions that may be formed and processed easily. It would be desirable that the nicotine particles and compositions not stick to processing surfaces or agglomerate and exhibit a stable particle size distribution. It would also be desirable that the nicotine particles and compositions be deliverable to the lungs at air flow rates that are within conventional smoking regime inhalation or air flow rates.

Summary of Invention

This disclosure is directed to a particle that comprises nicotine, a sugar and an amino acid. The particle preferably has a size in a range from about 0.5 to about 10 micrometres, or from about 0.5 to about 5 micrometres. The particle preferably comprises about 25 wt% or less nicotine or from about 5 to about 15 wt% nicotine. A free flowing composition may be formed by these particles.

In one aspect, there is provided a particle comprising nicotine, a sugar, and an amino acid or short peptide.

In another aspect, there is provided a composition a plurality of particles as described herein, wherein about 90% of the plurality of particles have a particle size of about 4.5 micrometres or less, and about 50% of the plurality of particles have a particle size of less than about 2.5 micrometres.

In another aspect, there is provided a method comprising combining nicotine, a sugar, and an amino acid or short peptide in a liquid carrier to form a liquid mixture; andspray drying the liquid mixture to form a plurality of particles having a size in a range from about 0.5 to about 10 micrometres or in a range from about 0.5 to about 5 micrometres.

Detailed Description