material. Extraction of analytes from solid materials and, in particular, porous meshes such as may be found in swab heads may lead to the introduction of bubbles and air gaps into the resulting fluid stream. Preferably, the sample chamber or the downstream fluidic components (e.g., the sample conduit) include a bubble trap to remove air introduced during an extraction step.

[0188] **FIG. 28** shows a cross-sectional view of one exemplary embodiment of a sample chamber for extracting analyte from a solid or solid-containing matrix. Elongated sample chamber **2810** has a sample introduction port **2820** equipped with a sealable closure as described above. The sample chamber is shown holding an applicator stick, specifically swab **2830** having absorbent swab head **2835**. Reagent conduit **2840** and sample conduit **2845** are arranged to intersect sample chamber **2810** on opposing sides of swab head **2835** so that extraction reagent introduced through reagent conduit **2840** passes through swab head **2835** before entering sample conduit **2845**. Optionally, a filter element **2848**, may be included to remove particulates from the extracted sample. Preferably, the width of sample chamber **2810** in the region that surrounds the head of an inserted applicator stick is less than two times (more preferably less than 1.5 times, even more preferably less than 1.2 times, most preferably equal to or less than 1.0 times) the width of the widest region of the applicator stick that needs to pass through that region during insertion of the applicator stick. Alternatively, the cross-sectional area of sample chamber **2810** in the region that surrounds the head of an inserted applicator stick is less than four times (more preferably, less than two time, most preferably less than or equal to 1.0 times the cross-sectional area of the widest region of the applicator stick that needs to pass through that region. When used to extract sample from porous compressible materials (e.g., a swab having a porous compressible head), the width of the sample chamber is selected so that the width is narrow enough around the applicator stick head so that the material fills most or all the width of the chamber (ensuring the most efficient flow of extraction buffer through the material) but wide enough so that material can be easily inserted without the need for excessive force and without causing leakage of fluid in the material onto the outside surfaces of the cartridge (optionally, both properties may be achieved by use of a chamber that, with respect to a seated applicator stick is narrower in the region that surrounds the head than in the region that surrounds the shaft). In certain preferred embodiments, these properties are achieved while. Advantageously, sealing sample port **2820** prevents the release of air from that end of sample chamber **2810** and prevents the wasteful flow of extraction reagent away from sample conduit **2845**. Optionally, swab **2830** and/or chamber **2810** are designed so that swab **2830** fits completely into chamber **2810**. Alternatively (as shown), an applicator stick is too long to fit in chamber **2810** (e.g., the length of swab necessary to collect a mucous sample from the throat or nasal cavity may be too long to fit within the desired form factor of a cartridge) but is cleaved (e.g., broken, fractured, cut or otherwise detached) prior to or, preferably, after its introduction into chamber **2810** so as to produce a shortened stick fragment comprising the sample collection head. The shortened fragment is short enough to fit in chamber **2810** and allow closure **2825** to be sealed. In certain embodiments, the swab is designed to allow for easy detachment by having, e.g., a reversibly detechable head or by including a weak point in the shaft that allows for facile fracture of the shaft.

[0189] One method of introducing an applicator stick such as swab **2830** to sample chamber **2810** comprises i) introducing it into chamber **2810**; ii) cleaving the swab shaft to form a head segment (comprising the head) and a shaft segment and iii) sealing the head segment in chamber **2810** by sealing closure **2825**. The method may further comprise iv) introducing an extraction reagent through reagent conduit **2840**; v) extracting analyte from swab head **2830** by passing extraction reagent through swab head **2835** and vi) removing the extracted analyte through sample conduit **2845**. The extracted analyte may then be directed to a detection chamber for analysis. In one preferred embodiment, the shaft is cleaved by applying a force to the exposed end of the shaft of swab **2830** in a direction perpendicular to the length of chamber **2810** so as to break the shaft at an edge **2827** of chamber **2810** and allow removal of the part of the shaft that extends out of the chamber. Preferably, swab head **2830** is seated against the opposing end of chamber **2810** prior to cleaving the shaft.

[0190] In an especially preferred embodiment, the shaft of swab **2830** is constructed to have weak point (shown as weak point **2837**) so that application of a force causes swab **2830** to reproducibly break at the weak point. Preferably, the swab shaft includes a stress/strain concentration feature (notch, score, or the like), e.g., the weak point is introduced by making the swab shaft narrower at the weak point or by "scoring" the shaft (i.e., cutting or etching one or more notches into the shaft at the weak point). Preferably the notch forms a circuit around the shaft so that the shaft may be broken in any direction. Such a notch may be made by cutting a groove in the shaft (e.g., with a tool or a laser) while turning the applicator stick on a lathe. Most preferably, the weak point is located so that when the shaft is inserted into chamber **2810** it is sufficiently near to edge **2827** so that a sufficient force can be applied to break the shaft, but sufficiently close to head **2835** so that the closure **2825** can be sealed.

[0191] The sample chamber may also include additional passive and/or active features to promote a facile and reproducible break of a swab within the sample chamber. Passive features may include one or more of, e.g., geometrical configuration/arrangement of the sample chamber itself (e.g., curvature or angles along the length of the sample chamber), force focusing elements (e.g, protrusions from the internal walls of the sample chamber), and the like. Active features may include one or more actuatable mechanisms arranged and configured within the sample chamber for cleaving the swab, e.g., a "guillotine" device similar to a cigar cutter that can be actuated by a user exerting a force upon the device.

[0192] **FIG. 29** shows sample chamber **2910**, an adaptation of sample chamber **2810**. Sample chamber **2910** has a constriction defined by protrusions **2990** that project inward from the walls of the chamber to form force focusing elements within the chamber. As illustrated in the figure, applying a lateral force to swab **2930** that is seated in sample chamber **2910** causes the swab shaft to contact one or more protrusions **2990**. The lateral force is thereby focused on one location on the swab, promoting breakage of the swab at that location. Preferably, the swab and sample chamber are