chamber and then into the waste chamber. Reagent is then moved into the detection chamber and a signal is measured.

[0037] The step of moving the sample into the sample conduit may involve opening the sample vent port and applying a vacuum to the first waste chamber vent port. The sample slug may be moved into the detection chamber by opening the air vent port and applying a vacuum to the first waste chamber vent port. Moving the reagent may be accomplished by opening the reagent vent port and applying vacuum to the first waste chamber vent port. Optionally, moving the reagent may also comprise opening the air vent port to segment the reagent.

[0038] The assay may be a binding assay where the detection chamber comprises one or more immobilized binding reagents and the first dry reagent comprises one or more labeled binding reagents. The signal may be an electrochemiluminescent signal wherein the detection chamber further comprises electrodes, the one or more labeled binding reagents can comprise one or more electrochemiluminescent labels and the first reagent may comprise an electrochemiluminescence coreactant.

[0039] In certain embodiments the dry reagent may be reconstituted by moving the sample back and forth over the dry reagent. In addition, the slug of sample may be moved back and forth in the detection chamber. Moving fluids back and forth can be accomplished by opening the air or sample chamber vent port and alternating between applying positive and negative pressure at the waste chamber vent port.

[0040] Selective control of fluid movement may be attained by moving sample and/or reagent for predetermined periods of time. Alternatively, some embodiments may move sample and/or reagent until the sample and/or reagent reach predetermined locations. In addition, certain embodiments may use fluid sensors to determine when the sample and/or reagent reach the predetermined locations. The slug of sample may be mixed in the detection chamber by moving the slug back and forth within the detection chamber. In certain embodiments the sample conduit and/or reagent conduit may comprise a z-transition that act as a capillary break.

[0041] The method may also comprise adding the sample to the sample chamber through a sample introduction port and sealing the sample introduction port. The invention includes embodiments where the sample is a liquid sample and/or the sample contains a solid matrix. The method may also be utilized where the sample chamber is connected to the sample chamber vent through an extraction chamber containing an extraction reagent.

[0042] In yet another embodiment, the cartridge based assay method may be carried out on a cartridge having a second vented waste chamber and a second detection chamber connected to the sample chamber by a second sample conduit branch containing a second dry reagent and to the second waste chamber by a second waste conduit. The method would further comprise moving the sample from the sample chamber into the second sample conduit branch, reconstituting the second dry reagent in the sample, moving a second slug of sample having a predetermined volume into the second detection chamber, moving the second slug in the second detection chamber into the second waste chamber, moving reagent into the second detection chamber and measuring a signal from the second detection chamber. The reagent conduit may also comprise a third dry reagent. Other embodiments may employ a second reagent chamber containing a second reagent, wherein the second reagent chamber is connected to the sample conduit or the first reagent conduit through a second reagent conduit and the second reagent is moved into the detection chamber.

[0043] Still other embodiments of a method for performing a cartridge based assay may comprise the steps of moving the sample from the sample chamber into the first sample conduit, reconstituting the first dry reagent in the sample, moving a slug of the sample into the first detection chamber, moving the sample in the first detection chamber into the waste chamber, moving the reagent into the detection chamber and measuring a signal from the detection chamber. Such a method may utilize a cartridge having a detection chamber that has an elongated dimension where the sample and reagent conduits connect to the detection chamber at substantially opposite ends of the detection along the elongated dimension. Additionally, the method may be performed such that the sample slug moves through the detection chamber along a path in a forward direction and the reagent moves through the detection chamber along the path in the reverse direction.

[0044] In still further embodiments, the method may be performed on a cartridge having second waste and detection chambers where the second detection chamber is connected to the first detection chamber conduit by a second reagent chamber conduit and to the second waste chamber by a second waste conduit. The method may include the step of moving the reagent into the second detection chamber and measuring a signal from the second detection chamber.

[0045] In accordance with another aspect of the invention, a method for preparing a sample for analysis may include the steps of inserting an applicator stick, which has a shaft and a sample collection head, used to collect a sample into a cartridge having a sample chamber, breaking the shaft of the applicator stick into a shaft segment and a head segment and sealing the head segment in the sample chamber. The inserting step may occur concurrently with the breaking step or may occur prior to the breaking step. The breaking step may be carried out by applying a force perpendicular to the shaft. Optionally, the sample chamber may include force focusing elements.

[0046] In yet other embodiments, the assay cartridge used in the method for preparing a sample for analysis may have a sample chamber that has an elongated cavity, the elongated cavity comprising a first elongated region and a second elongated region wherein the two regions are oriented at an angle with respect to each other. The inserting step of a method using such an assay cartridge may comprise pushing the sample collection head through the first region and into the second region causing the shaft to bend and break. In certain embodiments, the applicator stick breaks at a predefined weak point located on shaft. Preferably, the weak point is located between the first and second regions when the applicator stick is fully inserted.

[0047] In a still further embodiment, the method of preparing a sample for analysis may comprise passing an extraction reagent through the sample chamber having the head segment to form a sample liquid and then introducing the sample liquid into the detection chamber. In addition, the