Claims

1. A system comprising:

a flow path to be fluidically connected with a flow cell to support analytes of interest in an analysis system;

a selector valve fluidically coupled to the flow path to select between a plurality of reagent sippers for an analysis operation;

a bypass line that is separate from the flow path, wherein a portion of the bypass line serves as a mixing volume;

a pump to be fluidically connected with the bypass line and to displace fluids through the bypass line during a reagent pre-mixing operation; and

control circuitry operatively coupled to the selector valve and to the pump, the control circuitry having one or more processors and a memory that stores machine-executable instructions which, when executed by the one or more processors, control the one or more processors to:

a) cause the selector valve to select between a set of reagent sippers associated with reagents to be pre-mixed,

b) cause the pump to aspirate fluid from each of the selected reagent sippers and to deliver the fluids aspirated from the corresponding selected reagent sippers one-by-one into the mixing volume,

c) cause the pump to dispense the aspirated fluids in the mixing volume resulting from (b) through a destination recipient sipper, and

d) cause the pump to cyclically move the aspirated fluids into and out of the mixing volume and through the destination recipient sipper to further mix the fluids.

2. The system of claim 1, wherein the mixing volume comprises a serpentine channel.

3. The system of claim 1, further comprising a destination recipient positioned to receive fluids ejected through the destination recipient sipper, wherein the destination recipient contains DNA to be sequenced.

4. The system of claim 1, wherein the pump comprises a syringe pump.

5. The system of claim 1, wherein the memory stores further machine-executable instructions which, when executed by the one or more processors, further control the one or more processors to cause the selector valve together with the pump to aspirate air into the mixing volume prior to delivering the fluids from the selected reagent sippers into the mixing volume.

6. The system of claim 5, wherein the memory stores further machine-executable instructions which, when executed by the one or more processors, further control the one or more processors to cause the pump to cyclically move the aspirated fluids into and out of the mixing volume while maintaining a volume of air trapped between the pump and the fluids.

7. The system of claim 1, wherein the memory stores further machine-executable instructions which, when executed by the one or more processors, further control the one or more processors to cause (b) to be repeated one or more times prior to the performance of (c) or (d) for the analysis operation.

8. The system of claim 7, wherein the memory stores store further machine-executable instructions which, when executed by the one or more processors, further control the one or more processors to:

(e) cause the selector valve to select an additional reagent sipper associated with an additional reagent,

(f) cause the pump to aspirate fluid from the additional reagent sipper, and

(g) cause the pump to deliver the aspirated additional fluid from the additional reagent sipper into the mixing volume, wherein the additional reagent sipper is not in the set of reagent sippers from (a) and wherein (e)(g) are performed in between (b) and (c).

9. The system of claim 1, further comprising reagent recipients containing at least three reagents of different specific gravities to be pre-mixed.

10. A method utilizing the system of claim 1, the method comprising:

a) performing a reagent pre-mixing operation for two or more reagents including:

commanding the selector valve to select a first reagent;

actuating the pump to aspirate a portion of the first reagent from a first recipient into the mixing volume;

commanding the selector valve to select a second reagent; and

actuating the pump to aspirate a portion of the second reagent from a second recipient into the mixing volume;

b) actuating the pump to cyclically move the aspirated reagents into and out of the mixing volume and through the destination recipient sipper to mix the reagents; and

c) actuating the pump to eject the mixed reagents into a destination recipient.

11. The method of claim 10, wherein the mixing volume comprises a serpentine channel.

12. The method of claim 10, wherein the destination recipient contains DNA to be sequenced.

13. The method of claim 10, wherein (a) further comprises commanding the selector valve to select a third reagent and actuating the pump to aspirate a portion of the third reagent from a third recipient into the mixing volume.

14. The method of claim 13, wherein (a) further includes selecting and aspirating at least one of the reagents more than once prior to performing (b).

15. The method of claim 14, further comprising repeating (a) one or more times prior to performing (b).

16. The method of claim 10, comprising aspirating air into the mixing volume prior to aspirating the first reagent.

17. A method utilizing the system of claim 1, wherein the mixing volume comprises a serpentine mixing volume, the method comprising:

actuating the pump to aspirate a gas into the serpentine mixing volume;

controlling the selector valve to select, one-by-one, a plurality of liquid reagents for the analysis operation;

for each selected reagent, actuating the pump to aspirate the selected reagent from a respective recipient containing the selected reagent into the serpentine mixing volume;

controlling the selector valve to fluidically connect the serpentine mixing volume with a destination recipient through the destination recipient sipper;

cycling the pump to move the reagents into and out of the serpentine mixing volume and through the destination recipient sipper to mix the reagents, wherein the destination recipient contains an analyte of interest to be analyzed in the analysis operation; and

actuating the pump to eject the mixed reagents into the destination recipient.

18. The method of claim 17, comprising selecting and aspirating each reagent more than once prior to cycling the pump to move the reagents.

19. The method of claim 17, wherein the pump cyclically moves the reagents with a volume of air between the pump and the reagents.

20. The method of claim 17, wherein the reagents comprise at least three reagents of different specific gravities.