of the instrument and/or escape of the sample fluid. Preferably, vent conduit **2750** has sufficient volume in the fluidic conduit so that a small amount of sample fluid, e.g. as may be observed if the sample is foamy or has bubbles, may enter the conduit without being pulled all the way to vent port **2740**. In one embodiment, as depicted in FIG. **9**, a well/trap **975** may be arranged within the fluidic conduit. In another embodiment, as depicted in FIG. **20**, the fluidic conduit may be extended/lengthened, e.g., utilizing a serpentine configuration **2030**.

[0180] Cap **2760** can be used to seal sample introduction port **2720** without preventing the flow of air through vent conduit **2750**. In FIG. **27**, the fluidic compartments and conduits are formed by recesses (e.g., channels) or holes in cartridge body **2770** and by cover layer **2780** which is sealed against cartridge body **2770**. Sample chamber **2710** has internal ledge **2790**. Vent conduit **2750** includes a vertical hole from the bottom of cartridge body **2770** to the top face of ledge **2790**. This arrangement provides for a simplified manufacturing process that is amenable to injection molding or machining of the cartridge body; other arrangements of the vent conduit will be readily apparent to the skilled artisan.

[0181] FIGS. **47**(*a*)-(*c*) illustrates an alternate embodiment of a sample chamber that includes a feature for preventing over-filling of the chamber and a feature to provide the user with a visual indication of the liquid level in the chamber. In one embodiment, the assay cartridge includes a sample chamber, a sample indicator window, a reflecting surface, and an optical path connecting the sample chamber, sample indicator window and the reflecting surface. The figure shows the sample chamber from the top (FIG. **47**(*a*)) and as a cross-sectional slice (FIG. **47**(*b*)). Sample chamber **4700** includes a sample well **4720** with a sample introduction port with a sealable cap **4722**, which may have locking features as described for cap **3500** above. The sample chamber **4700** is linked to a sample conduit **4730**, which is used to transfer sample from the sample chamber to other sample processing fluidic components of a cartridge (e.g., as described for cartridges **900**, **1400**, **2500**, **3200** and **3700**). The sample conduit is arranged to intersect the sample chamber below the expected sample height and, preferably, at or near the bottom of the chamber. The sample conduit may include a Z-transition, other capillary break or valve element (not shown).

[0182] Sample chamber **4700** is also linked to sample overflow conduit **4740**, which intersects the chamber above the level of the volume of sample required by the cartridge and which connects the sample chamber to overflow chamber **4742**. Overflow chamber **4742** vents through vent conduit **4750** (which, preferably, connects at or near the top of the overflow chamber) to the sample vent port (not shown). If during sample addition the user accidently adds too much sample, the excess sample will drain into the overflow chamber instead of overfilling the sample chamber and contaminating the top of the cartridge.

[0183] Sample chamber **4700** also provides sample indicator window **4770** to allow a user to view the level of a liquid sample in the sample chamber. A reflecting surface, e.g., mirrored surface, **4772** in the cartridge body is positioned such that it reflects a side view of the chamber (showing the height of the sample in the chamber) onto the indicator window. FIG. **47** shows a volume of sample in the sample chamber (the sample is represented as hatched lines and the top of the sample volume is represented, in side view, as a dark black line) and also shows the liquid level as it would be observed by a user looking at the indicator window from the top of the cartridge. The viewer window may have indicating features, such as indicating line **4772**, that indicate minimum, maximum or target sample levels. For example, the indicator window may include one or more indicating lines that reflect a fluid level within the sample chamber, e.g., a sample minimum, a sample maximum, a target or desired level, and combinations thereof. The indicator window may have one or more indicating lines. Alternatively, the targeted minimum and/or maximum sample volumes may be indicated by the defined boundaries of the indicator window (e.g., the user may be instructed to add sample until the top of the sample is seen in the indicator window).

[0184] Therefore, using an assay cartridge including an indicator window allows the user to determine an appropriate fluid level in the assay cartridge. Briefly, the user would add a volume of fluid to the sample chamber. The fluid level is reflected via the optical path to the indicator window. The user may view the fluid level in the sample indicator window and compare the fluid level viewed in the window to an indicating feature on the window. In one embodiment, the window includes a line indicating a sample minimum, sample maximum, and/or a target fluid level and the user may view the actual fluid level in the sample chamber relative to the indicating feature on the window.

[0185] As shown by the dotted line in FIG. **47***b*, a cartridge comprising sample chamber **4700** has an optical path from the sample in the sample well to mirror surface **4772** to the indicator window. The optical path should be transparent to at least a portion of the visible light spectrum and is, preferably, transparent to visible light. Mirror surface **4772** may be any reflecting surface. In one embodiment of sample chamber **4700**, mirror **4772** is provided by total internal reflection at an angled surface in the cartridge body, the angle being set such that the incident angle along the optical path is greater than the critical angle for total internal reflection at the interface. As shown in the figure, a totally internally reflective surface may be provided by incorporating a cavity in the cartridge body with a surface angled relative to the optical path (e.g., cavity **4774**) such that light traveling in the cartridge body hits the air-body interface at the surface of the cavity and is reflected. One of ordinary skill in the art will be able to select appropriate angles of incidence for specific materials. In certain embodiments, the angle of incidence is selected to be greater than or equal to 43°, a value which will provide total internal reflection at an air interface for a wide variety of transparent engineering materials with refractive indices greater than or equal to 1.46 including many silica glasses and plastics used in injection molding (such as polystyrene and polymethylmethacrylate). Preferably, the angle of incidence is selected to be 45° to provide for reflection at a right angle (as shown in the figure).

[0186] In one non-limiting embodiment of sample chamber **4700**, the sample chamber is included within a multi-part injection molded cartridge, using a design approach analogous to the one shown for cartridge **1400** in FIG. **14**. One suitable multi-part design is illustrated in FIG. **47***c* and comprises a cartridge top, a cartridge bottom and a cover layer mated to the cartridge bottom (dashed lines in the figure being used to show, conceptually, one way to divide the design into its components). Optionally, the optical path from the mirror to the window is provided by a single injection molded part, e.g., the cartridge top in FIG. **47***c*. It should be noted that, while FIGS. **47***b* and **47***c* show the optical path and conduits