buffer (Lysis Buffer In) fluidly connected via a second pump (**P2**) to the second single-use fluidic pathway (**2a**); the first and second fluids being combined, directly or using a mixer, into a third single-use fluidic pathway (**3a**); the third fluidic pathway (**3a**) being fluidly connected to at least one third container (**3**) comprising disposable (e.g., preferably single-use) tubing within which the cells are at least partially lysed to release the plasmid nucleic acids and, if more than one third container (**3b**) is present, each third container being fluidly connected to one another in series by one or more additional single-use fluidic pathways (**3b**) and comprising an exit fluidly connected to a fourth single-use fluidic pathway (**3c**) (the third container being a retention tubing cartridge); a fourth container (**4**) comprising neutralization buffer fluidly connected via a third pump (**P3**) to the single-use flow path through a fifth single-use fluidic pathway (**4a**); and, the fourth (**3c**) and fifth (**4a**) single-use fluidic pathways being combined, directly or using a mixer, into a sixth single-use fluidic pathway (**5**) containing final product (released plasmids and cell debris); wherein: the fluids in the first (cells) (**1a**) and second (alkaline lysis buffer) single use fluidic pathways (**2a**) are combined into the third fluidic pathway (**3a**) that is fluidly connected to the at least one third container comprising disposable retention tubing (retention tubing cartridge); the fluid in the third container (**3/ 3b**) is maintained therein (retention tubing section) for a sufficient amount of time to lyse cells and release plasmids from the cells while minimizing degradation of the plasmids, and exits the retention tubing section through the fourth fluidic pathway (**3c**); and, the fluid of the fourth fluidic pathway is combined, directly or using a mixer, with neutralization buffer from the fourth container (**4**) in the fifth fluidic pathway (**4a**) and exits the single-use flow path through a seventh fluidic pathway (**6**) (Product Out). In some preferred embodiments, the retention tubing section (**3/3b**) comprises multiple subsections fluidly connected to one another, each subsection comprising pre-packaged disposable tubing within a rigid container wherein each may contain the same or different lengths and/or types of disposable tubing therein. In preferred embodiments, the retention tubing section (**3/3b**) includes four such subsections. In some embodiments, the flow of cells, lysis buffer, and/or neutralization buffer through the system is controlled by a process controller such as a Programmable Logic Controller (PLC) or Distributed Control System (DCS), with a Human-Machine Interface (HMI) used for inputting process recipe parameters, monitoring the process, and collecting process data. In some embodiments, the at least one inline analytical instrument measures pH and/or conductivity of at least one fluid, buffer and/or stream. In some embodiments, the flow of cells, lysis buffer, and/or neutralization buffer