Waters Lab Highlights

An Internal Communication of Applications and Techniques

LAH 0250 5/85
PC/LS/ED/OT/OT

SOLVENT SWITCHING APPLICATION FOR THE WATERS AUTOMATED VALVE STATION (WAVS)

The Waters Automated Valve Station (WAVS) automates many of the repetative pre- and post-chromatographic sample preparation operations that are often too tedious or unreliable when done manually. The WAVS can be used to automate various chromatographic procedures including on-line sample cleanup, trace enrichment, methods switching, column flushout and equilibration, sequential analytical separations, and small-scale, staged preparative separations. It can also eliminate the complexity and inconvenience often associated with valve switching.

Recently, in our laboratory, the WAVS has been used for solvent switching in a chemical compatibility study for a new column packing material. A buffered salt gradient mobile phase was employed for the fractionization of a protein sample that was utilized to evaluate the compatibility of the solvent of interest (a cleaning agent) on the column. A schematic diagram of the WAVS configured for this purpose is illustrated in Figure 1. After a chromatographic run, the WAVS was used to switch first to an intermediate solvent (water) and then to the desired cleaning agent. After the desired volume of the cleaning agent had been introduced to the column, the WAVS was used to switch back to the intermediate solvent, and then back to the mobile phase for equilibration of the column. At this stage, another chromatographic run was made to determine the effect, if any, of the cleaning agent on the column as measured by efficiency and resolution. Through the appropriate system controller program, the WAVS could be used to accomplish any combination of runs and washes with the cleaning agent, thus automating the entire system for routine and/or extended (i.e. overnight) use. One such combination is outlined in Table 1.

This automated setup is advantageous for several reasons. The WAVS can be used to rinse the system with the intermediate, non-buffered solvent so that upon unattended instrument shutdown, the buffered mobile phase would not be left static in the system. This also results in both the added bonus of reduced buffered solvent consumption and decreased likelihood of introducing bacteria from the buffered solvent to the column through extended use. Using the WAVS in this manner also allows the user the ability to prevent buffer precipitation that can happen with organic solvent contact, by first switching to an intermediate solvent. In addition, operator error inherent in manual switching modes is also reduced. These advantages are all realized in addition to the standard solvent and column switching capabilities for methods development and routine use in chromatographic separations.

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FIGURE 1

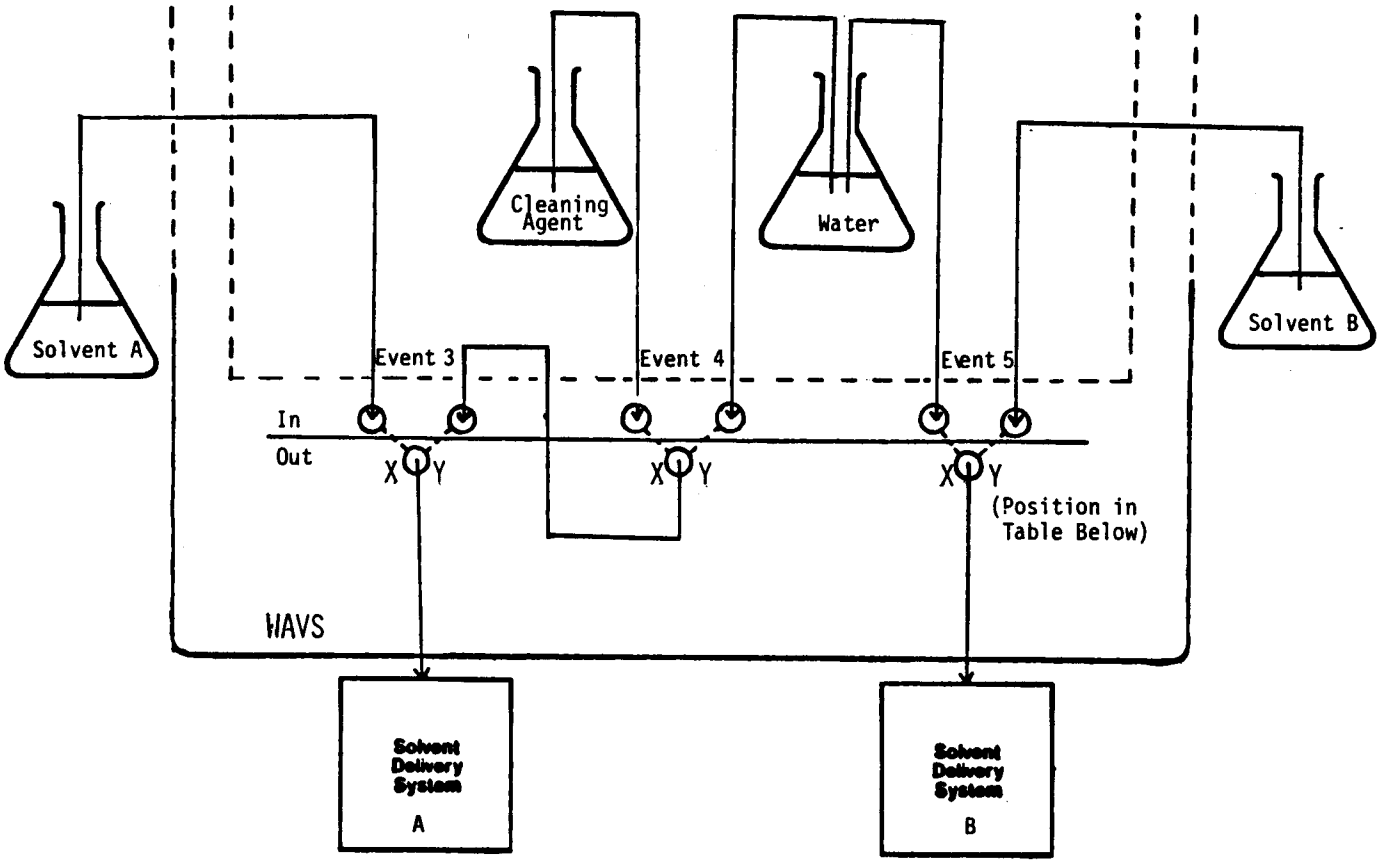

TABLE 1

FUNCTION	EVENT POSITION			SOLVENT DELIVERY SYSTEM STATUS		
EVENT:	3	4	5	SYSTEM: A	B	
Chromatographic Run	X	Y	Y	ON	ON	Gradient
Flush Prior to Cleaning Agent	Y	Y	Y (off)	ON	OFF	Water Flush
Cleaning Agent	Y	X	Y (off)	ON	OFF	
Flush Prior to Run	Y	Y	Y (off)	ON	OFF	Water Flush
Chromatographic Run	X	Y	Y	ON	ON	Gradient
Flush (H_2O) for Shutdown	Y	Y	X	ON	ON	Water Flush
				OFF	OFF	PUMPS OFF