ChiralTek Product Manual and Application Notes for PSPE Series of Positive-pressure SPE Systems

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ChiralTek Pte Ltd
3 Soon Lee Street
#04-06 Pioneer Junction
Singapore 627606
https://chiraltek-column.com

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Warranty: This device is warranted from defects for a period of 365 days from the date of shipment. The warranty for defects is limited to the purchase price of the product.

ChiralTek Pte Ltd
3 Soon Lee Street
#04-06 Pioneer Junction
Singapore 627606

Content Directory

ChiralTek PSPE Series of Positive-pressure SPE Systems Product Manual and Application Notes

1. About PSPE Systems

The PSPE series of positive-pressure solid phase extraction (SPE) systems are successfully manufactured by ChiralTek using a novel flow-path-integration technique. They are designed for complicated biological and environmental samples. The PSPE systems are controlled by built-in single-chip microcomputer units (SCU) and driven by compact air-pumps with easy operations. They are the first type of compact, affordable, and cost-efficient commercial positive-pressure SPE systems which can completely eliminate cross-over contaminations.

There are 4 types and 8 models of PSPE systems with different configurations. Type "A" and "B" systems use 6-mL, 3-mL, and 1-mL SPE cartridges while type "C" and "D" systems use 12-mL, 6-mL, and 3-mL SPE cartridges. Type "A" and "C" systems are designed for small volume samples only. However, type "B" and "D" systems can easily handle both small and large volume (no upper limit) samples.

Figure A. Typical picture of a PSPE-08A system

Figure B. Typical picture of a PSPE-08C system

For small volume samples (0.1 ~ 6N mL for Type "A" system or 0.2~12N mL sample for Type "C" system when repeating sample loading procedure for N times), all the channels and fittings linking to the air-pump are not contacted with samples and solvents during all processing procedures. Therefore, the cross-over contaminations are completely eliminated. This greatly improves the accuracy for kinds of trace-level analysis. There is no need to clean or wash the PSPE systems before and after extracting the small volume samples. This also makes type "A" and "C" PSPE systems very convenient for treatment of the complicated samples including environmental water/soil samples, food, tissue culture samples, animal and human serum/urine samples. The type "A" system is especially suitable for extraction of trace level of drugs and their metabolites in serum/plasma samples when using with ChiralTek ultra-high performance extraction (UPE) cartridges.

All PSPE systems are especially designed to perfectly work with the novel types of UPE cartridges manufactured by ChiralTek. Only small volume of solvents (0.2-0.3mL for 3-mL UPE-20 and UPE-30 cartridges, 1.2-1.5mL for 6-mL UPE-60 and UPE-90 cartridges, and 1.5-3mL for 12-mL UPE-120 and UPE-180 cartridges) are needed for conditioning and eluting when using the PSPE systems. Both the eluting and concentrating operations can be completed in one step without extra heating or nitrogen drying procedure when using UPE cartridges. This makes the PSPE systems very friendly to both environment and operators. All the elutes from SPE cartridges are directly collected into sample vials (PE vials or HPLC

vials) without passing through any connection tubing or fittings.

There are two independent flow systems in type “B” and “D” systems. For small volume samples, the air-pump channels and fittings are not contacted with samples and solvents during the all the processing procedure. However, there is a short part of fitting directly contact with large volume sample during automatic loading procedure. That part fitting needs to be cleaned and washed after the automatic sample loading procedure. The eluting solvents are not directly contact with PSPE system for both small and large volume samples. This greatly reduces or eliminates cross-over contaminations and makes the PSPE systems suitable for kinds of trace-level analysis.

The PSPE systems are operated under 12 voltages. An external power supply with 100-240V input and 12V output (standard configuration) or a 12-volatge rechargeable storage battery (optional configuration) can be used to operate all the PSPE systems.

2. PSPE Parts and Locations

The main parts of the PSPE system include a high-quality positive-pressure air pump with air filter inside the ABS main frame, a LCD control panel at the left-side of machine, a cooling fan at back of the system, SPE cartridge rack and adapters at front side, positive-pressure gas flow splitter & multi-channel controlling valves on the top of the system, etc..

The locations of the typical parts are showed in the Figure C. Since the PSPE systems are kept upgrading, the locations of certain parts might be changed. Please kindly refer to the reference documents and actual equipment received for details.

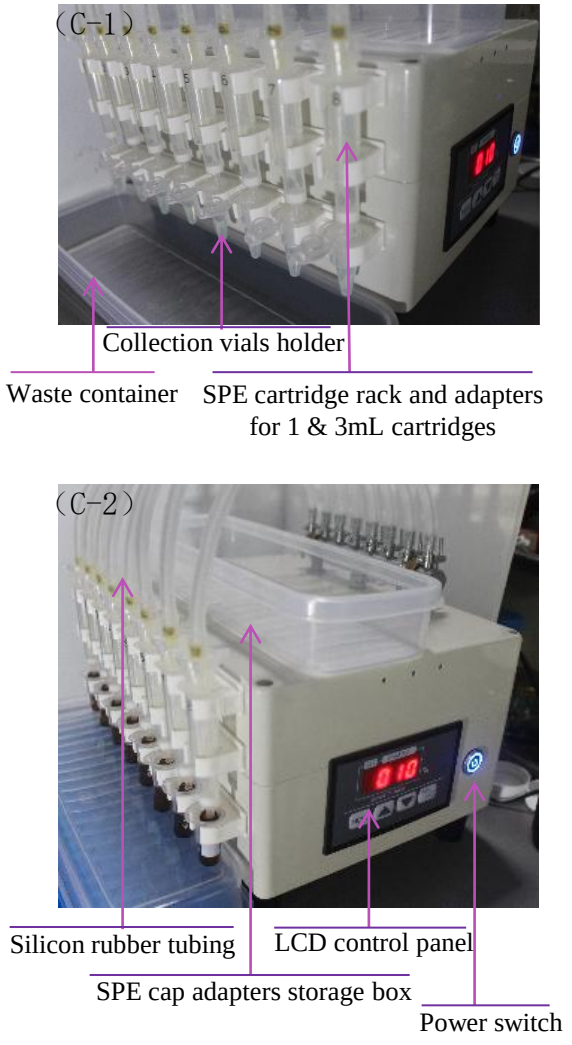

Figure C. Typical diagram of the PSPE parts and locations

3. PSPE Installation

All the settings and installation of tubing and fittings have been completely finished for the PSPE systems before delivery. Since the outer cover of the equipment is made from ABS material, the PSPE systems have very good chemical-resistant ability and excellent electricity-isolation ability. However, PSPE systems are relatively fragile when falling down. Therefore, the PSPE system should be placed on a stable and steady table for opening the packing box, installation of the equipment, and daily operations.

After opening the original packing box, please kindly keep the first layer of outer card-box, cushions, and second layer of internal plastic box. In the future, if you need to ship the PSPE system back to Singapore factory for warranty repair or major maintenance service, you have to use the original outer card-box plus internal plastic box to pack the system. If you cannot use the original packing material to pack for shipping, the warranty will be voided and Singapore factory will not provide any repair or maintenance service because other packing materials and packing methods will easily result in serious damages of the PSPE systems during shipping process.

If you found any tubing and fitting loosen or disconnected, please properly tighten or re-connect them according to their labeling numbers. If you found serious damages after opening the shipping box, please immediately contact local distributor.

The PSPE is shipped with a 12-V power supply. Before powering up the device, make sure the casing and components have no obvious damage from the shipping.

Make sure the 110 or 240V power socket has a ground connection and follow the following procedures for electric connection:

1) Place the PSPE instrument on a steady and stable working table in a well-ventilated space. Make sure that the seven rubber stands (as shown in Figure C-3) , especially the three rubber stands in the middle of the casing, touch well with the table surface. When flammable and volatile solvents are used, it is strongly recommended to place the PSPE instrument in fume hood.

2) Put the SPE cap adapters storage box on the top of the casing as shown in Figure C-2 and place waste container under the SPE cartridge rack as shown in Figure C-1.

3) Gently plug the power supply cable to the 12V power input port as shown in Figure C-3. Since the port base is made of ABS plastic which is easily to be damaged, please do not frequently pull out and plug in the power cable to avoid loosening and damaging the 12V power input socket.

4) Set power switch of the 100-240 AC power source socket at off position and then plug the 12 V power supply to the 100-240 AC power source. When the device is powered on, it will automatically initialize the microcomputer controlling unit and the air pump. Then the LCD will be lit up. This indicates installation is successfully finished.

4. Operation Procedure

1) Place the SPE cartridges onto the cartridge rack of the PSPE instrument. For the default factory configurations, the 1mL/3mL cartridge adaptors for type “A” & “B” systems and 3mL/6mL cartridge adaptors for type “C” & “D” instruments were already installed on the rack of the PSPE systems. Therefore, the 1mL/3mL SPE cartridges and 3mL/6mL SPE cartridges can be directly used on the type “A” & “B” and type “C” & “D” systems respectively. However, the cartridge adaptors (as shown in Figure C-1) are required to be carefully removed from the instrument if bigger SPE cartridges, e.g., 6mL cartridges for type “A” & “B” systems and 12mL cartridges for type “C” & “D”

systems, are to be used on the PSPE systems.

2) The ordinary users can easily operate the system and finish all the necessary extraction procedures by using the default factory settings of the LCD control panel. Figure D shows functions and locations of the power switch button and keys of LCD control panel.

3) Advance users can conveniently complete all the simple and complicated extraction procedures after configuring optional settings of the LCD control panel as follow.

① Press "MENU" key one time, "SET" menu displays "1" for setting slow startup time of air pump in the range from 0 to 10 seconds. The default slow startup time is 1 second (LCD displays 010). The slow startup time will be increased by 0.1 second every time when "Increase ▲" key is shortly pressed. The slow startup time will be reduced by 0.1 second every time when "Decrease ▼" key is shortly pressed. The the setting value for slow startup time will be saved to the memory of built-in single-chip microcomputer unit (SCU) after the "RUN/STOP" key is pressed. The SCU will still keep the setting value when power is switched off. Under this function menu, the flow rate of the PSPE system can be controlled in range from 000 to 100 levels.

② Continuously press "MENU" key two times, "SET" menu displays "2" for setting slow stop time of air pump in the range from 0 to 10 seconds. The default soft stop time is 1 second (LCD displays 010). The slow stop time will be increased by 0.1 second every time when "Increase ▲" key is shortly pressed. The slow stop time will be reduced by 0.1 second every time when "Decrease ▼" key is shortly pressed. Finally, the setting value for slow stop time will be saved to the memory of the built-in SCU after the "RUN/STOP" key is pressed. The SCU will still keep the setting value when the power is switched off. Under this function menu, the

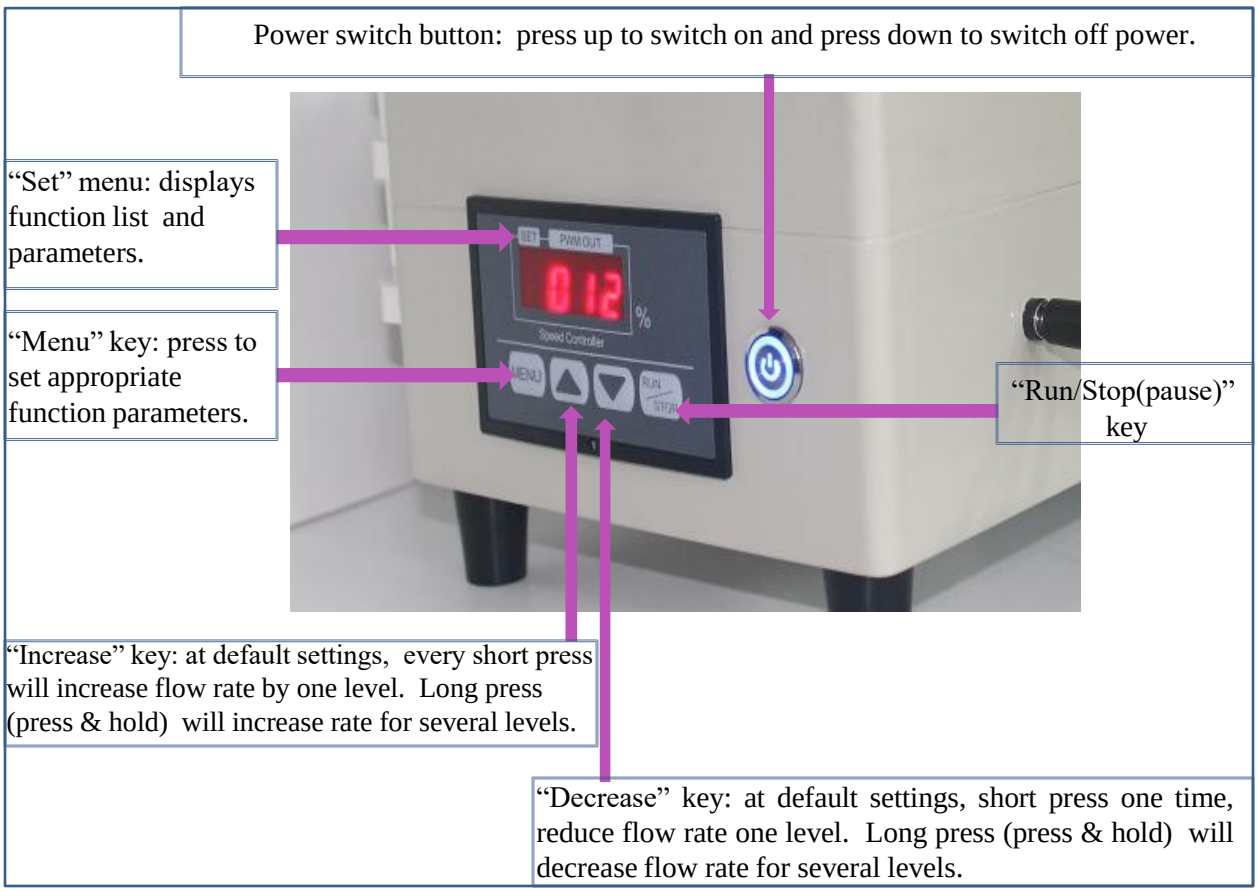

Figure D. Functions and locations of the power switch button and keys of LCD control panel.

flow rate of the PSPE system can be controlled in range from 000 to 100 levels.

③ Continuously press "MENU" key three times, "SET" menu displays "3" for setting the lower limit of flow rate of the air pump in the range from 0 to 80 levels. The default lower limit of flow rate is 0 level (LCD displays 000). The lower limit of flow rate will be increased by 1 level every time when "Increase ▲" key is shortly pressed. The lower limit of flow rate will be reduced by 1 level every time when "Decrease ▼" key is shortly pressed. Finally, the setting value for the lower limit of flow rate will be saved to the memory of the built-in SCU after the "RUN/STOP" key is pressed. The SCU will still keep the setting value when the power is switched off. Under this function menu, the lower limit of flow rate of the PSPE system can be controlled in range from 000 to 080 levels. Under the default settings, long pressing (press & hold) "Decrease ▼" key will quickly decrease flow rate for many levels to lower limit of flow rate of "0" level.

As shown in Figure D, when the lower limit of flow rate is level 12 (the air pump is stopped at level 12 and will start to work at level 13 in Figure D). The lower limit of flow rate of every PSPE system is slightly different due to the different workload of the system. An advance user can set the proper lower limit of flow rate according to the lowest working level of the specific PSPE system. Then, the flow rate can be quickly decreased to the pre-set value of the lower limit of flow rate. In the following operation step, the air pump will quickly start to work by pressing the "Increase ▲" key only one or two times to increase flow rate 1 or 2 levels.

④ Continuously press "MENU" key four times, "SET" menu displays "4" for setting upper limit of flow rate of the air pump in the range from 0 to 100 levels. The default lower limit of flow rate is 100 levels (LCD displays 100). The upper limit of flow rate will be increased by 1 level every time when the "Increase ▲" key is shortly pressed. The upper limit of flow rate will be reduced by 1 level every time when "Decrease ▼" key is shortly pressed. The setting value for the upper limit of flow rate will be saved to the memory of the built-in SCU after the "RUN/STOP" key is pressed. The SCU will still keep the setting value when the power is switched off. For the advance users, the upper limit of the flow rate is recommended to set as "40" to "60" levels. Then, long pressing "Increase ▲" key will quickly increase flow rate for many levels to the pre-set upper limit of flow rate of "40" to "60" levels to avoid blowing sample away (sample loss) by too high flow rate of the air pump.

⑤ Continuously press "MENU" key five times, "SET" menu displays "5" for setting increase/decrease gradient step values. The default value is 1 step (LCD displays 001 and means that the increase/decrease gradient step value will be increased or decreased by 1 level every time when "Increase ▲" key or "Decrease ▼" is shortly pressed respectively). The increase/decrease gradient step values will be changed as 001, 002, 005, 010, 015, 020, 025 respectively when the "Increase ▲" key is shortly pressed one time to seven times. On the contrary, when "Decrease ▼" key is shortly pressed every time, the increase/decrease gradient step values will be changed as 025, 020, 015, 010, 005, 002, 001 accordingly. Finally, the setting value for increase/decrease gradient step values will be saved to the memory of the built-in SCU after the "RUN/STOP" key is pressed.

When the increase/decrease gradient step value is set as 002, the adjusting function parameters, such as working flow rate, slow startup time of air pump, slow stop time of air pump, lower limit of flow rate, and upper limit of flow rate, etc., will be changed 2 levels very time when "Increase ▲" key or "Decrease ▼" is shortly press.

When the increase/decrease gradient step

value is set as 005, the adjusting function parameters will be changed 5 levels very time when "Increase ▲" key or "Decrease ▼" is shortly pressed.

Similarly, when the increase/decrease gradient step value is set as 010, 015, 020, or 025, the adjusting function parameters will be changed 10 levels, 15 levels, 20 levels, and 25 levels respectively very time when the "Increase ▲" key or "Decrease ▼" is shortly pressed.

It is strongly recommended to use the default setting of increase/decrease gradient step value of 001 since the ChiralTek PSPE systems are very sensitive to the changes of flow rate after the air pump is started.

4) For conducting the "Conditioning / equilibrating" operation, add in appropriate amount of solvents into the SPE cartridges, then cap the cartridge with the SPE cap adapters attached to the silicon tubing, finally press the "Increase ▲" key one time or several times to start the air pump till the solvents is started to drop into waste container from the SPE cartridges at a proper flow rate. After the conditioning / equilibrating solvents are completely pushed out from SPE cartridges by the air pump, pause the PSPE system by pressing the "RUN/STOP" key.

5) Before conducting the "Sample Loading" operation, keep the PSPE system paused, take out the SPE cartridge sealed with cap adapter from the SPE cartridge rack, hold the SPE cap adaptor with one hand, e.g., right hand, and pull out and disconnect the cap adaptor by turning while pulling down the SPE cartridge by using the other hand, e.g., left hand (as shown in Figure F). Then, place the SPE cap adapter attached to the silicon tubing to the SPE cap adapters storage box on the top of the PSPE system, and put the SPE cartridge back to the rack.

6) For conducting the "Sample Loading" operation, firstly, add accurate volume of sample by using pipette gun into the SPE cartridge (the cross-over contamination can be completely eliminated by putting outlet tip of the pipette about 1cm deep inside the cartridge tube); secondly, put back the SPE cap adapter with the silicon tubing attached to seal the cartridge according to its labeling code number; finally, press the "RUN/STOP" key to load sample. The loading speed can be controlled by adjusting flow rate through pressing "Increase ▲" key or "Decrease ▼" key. After all sample passing through the SPE cartridge, pause the PSPE system by pressing the "RUN/STOP" key.

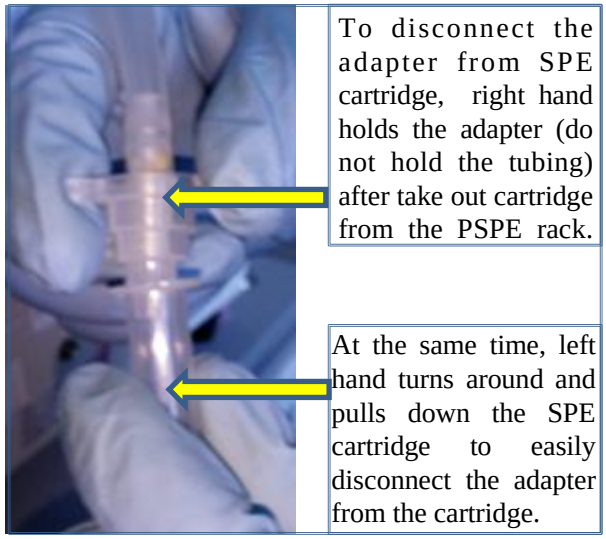

Figure F. Illustration of disconnecting SPE cap adapter from the cartridge.

7) For conducting the "washing" operation, disconnect the SPE cap adapter from the cartridges by using the above 5th step procedure, then add in appropriate amount of washing solvent., e.g, pure water or buffer etc., into the SPE cartridges by using pipette gun, after that, put back the SPE cap adapter with the silicon tubing attached to seal the cartridge according to its labeling code number, finally, press the "RUN/STOP" key to start pump to wash the cartridge. The washing speed can be controlled by adjusting flow rate through pressing "Increase ▲" key or "Decrease ▼" key. After all washing solvents passing through the SPE cartridge,

bed, continue to blow the SPE cartridge to allow all washing solvent drops are out of the cartridge, including the outlet tip part of the SPE cartridge, then press "Decrease ▼" key several times to reach lower limit of flow rate or initial flow rate of the air pump, finally pause the PSPE system by pressing the "RUN/STOP" key.

8) For conducting the "eluting" operation, firstly, place the polyethylene (PE) vials in the collection vials holder as shown in Figure C-1 (the vials can be easily placed in the holder by lifting up the SPE cartridge about 2-3 cm height from original position by one hand, and place the PE vials in the holder by the other hand.). If HPLC/GC glass vials are used as collection vials, place the waste container (together with the cover) upside down to support the HPLC/GC glass vials as shown in Figure C-2. Secondly, disconnect the SPE cap adapter from the cartridges by using the above 5th step procedure. Thirdly, add accurate volume of eluting solvent by using pipette gun into the SPE cartridge (the cross-over contamination can be completely eliminated by putting outlet tip of the pipette about 1 cm deep inside the cartridge tube). Fourthly, put back the SPE cap adapter with the silicon tubing attached to seal the cartridge according to its labeling code number. Fifthly, press the "RUN/STOP" key to elute. The eluting speed can be controlled by adjusting flow rate through pressing "Increase ▲" key or "Decrease ▼" key. After all eluting solvents passing through the SPE cartridge bed, continue to blow the SPE cartridge to allow all eluting solvent drops are out of the cartridge, including the outlet tip part of the SPE cartridge, then press "Decrease ▼" key several times to reach lower limit of flow rate or initial flow rate of the air pump, finally pause the PSPE system by pressing the "RUN/STOP" key. including the outlet tip part of the SPE cartridge, then press "Decrease ▼" key several times to reach lower limit of flow rate or initial flow rate of the air pump, finally pause the PSPE system by pressing the "RUN/STOP" key.

9) Repeating the above Step 4 to Step 8 can easily finish processing the next batch of samples. For PSPE-08A system, 1-, 3-, and 6-mL SPE cartridges can be used. Each cartridge can process 0.1 to 6 mL of sample when loading sample for one time only; It can easily process 0.1~ 6N mL of smples when repeating sample loading procedure for N times (repeating Step 5 and 6 operation for N times). Similarly, For PSPE-08C system, 3-, 6-, and 12-mL SPE cartridges can be used. Each cartridge can process 0.2 to 12 mL of sample when loading sample for one time only; It can easily process 0.2~ 12N mL of sample when repeating sample loading procedure for N times (repeating Step 5 and 6 operation for N times).

10) A proper number of multi-channel controlling valves in the flow splitter (as shown in Figure C-3) can be switched off (close position) when the sample number is less than the channel number of PSPE system. Each controlling valve can be individually adjusted to control flow rate of each channel during any step of extraction. When finished, switch off the power button and power off the external 12 V power supply. It is strongly recommended to disconnect (plug off) the 100-240 AC power source when the PSPE system is not used for weeks' time.

5. Application Notes

The human serum samples contain only trace level of Androgens and a lot of other high level of interference compounds. In order to accurately determine the content of the trace level of Androgens, removal of all the interference compounds is required in the sample preparation procedures. The cross-over contamination is a serious issue in the sample preparation, especially, when processing serum samples of patients with different ages, e.g., young patients have very high Androgen levels while old patients have very low Androgen levels. Unfortunately, contacting and mixing with residues of

previous sample residues in the tubing or holders of SPE instruments from other suppliers usually results in cross-over contaminations. This usually causes testing errors and serious inaccuracy problems. Fortunately, this type of cross-over contamination can be completely eliminated when using ChiralTek PSPE instruments.

As described in above operation procedure, all the channels and fittings linking to the air-pump in ChiralTek PSPE systems are not contacted with samples and solvents during all processing procedures. The final extracts are directly eluted from SPE cartridges into collection vials (PE vials or HPLC/GC glass sample vials) without passing through any tubing or holders. Therefore, there will be no cross-over contamination. A typical procedure for extraction of trace level of Androgens in human serum samples is shown in the following Figure G.

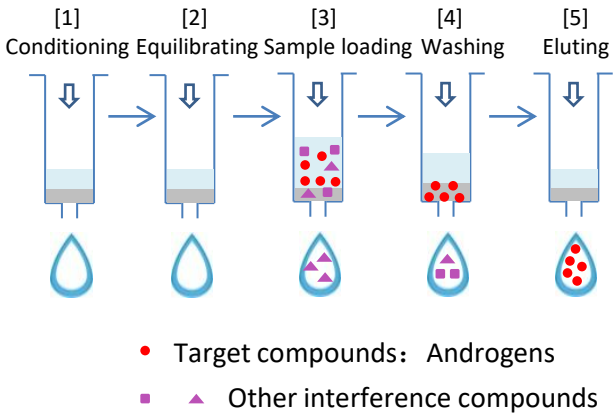

Figure G. Typical reversed phase extraction method using UPE-30 cartridges to extract androgens in human serum samples

When using 3-mL ChiralTek ultra-high performance extraction (UPE-30) cartridges, there are following five steps for the extraction procedure as shown in Figure G.

[1] *Conditioning column*: the UPE-30 cartridges are conditioned by 0.3 mL of methanol. After disconnecting the SPE cap adapter from the cartridges, then add in 0.3 mL of methanol into the UPE-30 cartridges by using pipette gun. After that, put back the SPE cap adapter with the silicon tubing attached to seal the cartridge according to its labeling code number. Finally, press "Increase ▲" key several times (when processing the first batch of samples at the beginning), or press the "RUN/STOP" key (when processing 2nd and next batch of samples from "pause" state) to start pump for conditioning the cartridges. The eluting speed can be controlled as around 2 drops per second by adjusting flow rate through pressing "Increase ▲" key or "Decrease ▼" key. After all methanol passing through the UPE-30 cartridges, pause the PSPE system by pressing the "RUN/STOP" key.

[2] *Equilibrating column*: the UPE-30 cartridges are equilibrated by 0.5 to 1 mL of physiological saline solution (or pure water). After disconnecting the SPE cap adapter from the cartridges, add in 0.5 to 1 mL of physiological saline solution (or pure water) into the UPE-30 cartridges. Then, put back the SPE cap adapter with the silicon tubing attached to seal the cartridge according to its labeling code number. Finally, press the "RUN/STOP" key to start pump to push the physiological saline solution (or pure water) out of the cartridges. The eluting speed can be controlled as around 3 drops per second by adjusting flow rate through pressing "Increase ▲" key or "Decrease ▼" key. After all liquds passing through the UPE-30 cartridges, pause the PSPE system again by pressing the "RUN/STOP" key.

[3] *Sample loading*: 1~3 mL of human serum (or plasma) samples diluted with 0.1 mol/L sodium acetate buffer (1:1, *v/v*) are passed through the UPE-30 cartridge. After disconnecting the SPE cap adapter from the cartridges, accurately add 1 to 3mL of human serum (or plasma) samples diluted with 0.1 mol/L sodium acetate buffer (1:1, *v/v*) into the SPE cartridge by using pipette gun (the cross-over contamination can be completely eliminated by putting outlet tip of the pipette about 1-cm deep inside the cartridge tube); then, put back the SPE cap adapter with the

the silicon tubing attached to seal the cartridge according to its labeling code number; finally, press the "RUN/STOP" key to load sample. The loading speed can be controlled as around 1 to 2 drops per second by adjusting flow rate through pressing "Increase ▲" key or "Decrease ▼" key. After all sample passing through the SPE cartridge, pause the PSPE system by pressing the "RUN/STOP" key.

[4] *Washing column*: 1 mL D.I. water (or pure water) is used to wash the UPE-30 cartridges to remove interference compounds. After disconnecting the SPE cap adapter from the UPE-30 cartridges, add in 1 mL D.I. water (or pure water) into the UPE cartridges, after that, put back the SPE cap adapter with the silicon tubing attached to seal the cartridge according to its labeling code number, finally, press the "RUN/STOP" key to start pump to wash the cartridge. The washing speed can be controlled as 2 to 3 drops per second by adjusting flow rate through pressing "Increase ▲" key or "Decrease ▼" key. After all washing water passing through the SPE cartridge, continue to blow the SPE cartridge to allow all washing drops are out of the cartridge, including the outlet tip part of the UPE-30 cartridge, then press "Decrease ▼" key several times to reach lower limit of flow rate or initial flow rate of the air pump, finally pause the PSPE system by pressing the "RUN/STOP" key.

[5] *Eluting target compounds*: 0.3 mL methanol is used to elute the Androgens from the UPE-30 cartridge. Firstly, place the polyethylene (PE) vials (as shown in Figure C-1) or HPLC/GC glass vials (as shown in Figure C-2) in the collection vials holder. Secondly, disconnect the SPE cap adapter from the cartridges. Thirdly, accurately add accurate 0.3 mL of methanol (by using pipette gun) into the UPE-30 cartridges (the cross-over contamination can be completely eliminated by putting outlet tip of the pipette about 1 cm deep inside the cartridge tube). Fourthly, put back the SPE cap adapter with the silicon tubing attached to seal the cartridge according to its labeling code number. Fifthly, press the "RUN/STOP" key to elute. The eluting speed can be controlled by adjusting flow rate through pressing "Increase ▲" key or "Decrease ▼" key. After all eluting solvents passing through the SPE cartridge bed, continue to blow the SPE cartridge to allow all eluting solvent drops are out of the cartridge, including the outlet tip part of the SPE cartridge, then press "Decrease ▼" key several times to reach lower limit of flow rate or initial flow rate of the air pump. Finally pause the PSPE system by pressing the "RUN/STOP" key for treatment of next batch of samples. The elutes collected in the 1.5-mL HPLC/GC glass vials can be directly injected into HPLC, LC-MS or GC-MS for final analysis.

Repeating the above five steps can easily complete the extraction of Androgens from the rest samples. When the number of the last batches of samples is less than the number of the PSPE channels, proper number of multi-channel controlling valves (shown in Figure C-3) on the flow splitter and can be switched off. When all extraction procedures are finished, switch off the power supply. It is strongly recommended to disconnect (plug off) the main power plug from the 110 or 240V power sock.

6. Repairs and Maintenance

Since the casing of the PSPE equipment is made from ABS material, the PSPE system have very good chemical-resistant ability and excellent electricity-isolation ability. However, the PSPE systems are relatively fragile when falling down. Therefore, the PSPE system should be placed on a stable and steady support surface for storage and daily operations.

Under normal working conditions with manual loading small volume of samples, all

the channels, fittings, and silicon tubing linked to the air-pump are not contacted with samples and solvents during all processing procedures. Therefore, the cross-over contaminations are completely eliminated. This greatly improves the accuracy for kinds of trace-level analysis. There is also no need to clean or wash the PSPE systems before and after extracting the small volume samples. However, if the silicon tubing and/or the SPE cap adapter with the silicon rubber tubing attached are contact with samples or solvents, the silicon tubing and SPE cap adapter can be cleaned and washed with water and proper solvents after disconnecting the silicon rubber tubing from the flow splitter. After drying at room temperature, the silicon tubing and SPE cap adapter can be placed back according to the number code on the tubing and cap adapter.

If the SPE cartridges are partially or completely blocked, the silicon rubber tubing may be disconnected from the flow splitter or SPE cap adapter. After changing the blocked SPE cartridges or filtering samples, reconnect the silicon rubber tubing with the flow splitter or SPE cap adapter according to the original number code.

It is strongly recommend to start with low flow rate and low air pressure at each operation to avoid unexpected disconnection of silicon rubber tubing due to the high air pressure. Besides the mentioned cartridges blockages, other multiple reasons may cause the silicon rubber tubing unexpectedly disconnected to release high air pressure. Therefore, please be kindly reminded that the outlets of the SPE cap adapter and the silicon tubing cannot be pointed to the eyes of operator or any person nearby the PSPE system to potential harm caused by this potential pressure releasing.

High quality air-filter is installed at the inlet of air pump in the PSPE system. It is nessorccery to changed the air-filter every 1 to 5 years according to different customers' different usages. The life time of the air-filter can be easily prolonged by frequently clean and wipe out the dusts on the working table and the outer surface of the PSPE system. When the flow rate is apparently reduced and the noise level is apparently increased, it is the time to change the air-filter. Please be kindly noted that air-filter change is not covered by the one-year manufacturer's warranty. Please contact the local distributor or ChiralTek support team in Singapore (support@chirlatek-column.com) if you needs to change the air-filter. There are specially-designed anti-casing-opening setups and parts in all PSPE systems. If the casing is opened by unauthorized person, those anti-casing-opening setups and parts cannot be restored back and the one-year manufacturer's warranty will be voided.

Since some parts of the PSPE systems are made from ABS, PE, PVC materials, a few special organic solvents, e.g., dichloromethane (DCM), Dimethyl sulfoxide (DMSO), N,N-Dimethylformamide (DMF) etc., are strongly advised to avoid using on the PSPE equipments.

7. Specifications

To meet kinds of users' different types of needs and requirements, the PSPE systems are designed to have many different configurations. The main specifications for the typical eight types of the PSPE systems are listed in the Table 1 on the next page.

Please visit English website http://chiraltek-column.com/Downloads.ph for downloading the updated and latest version of the product manual. Please call an international phone number (+65)-93656129 to directly contact ChiralTek team in Singapore for price enquiry or technical support. You also can call a special local phone number (+86)-95040358310 in the mainland of China to directly contact ChiralTek team in Singapore.

Table1. The main specifications of the typical eight models of PSPE systems

Part No. / Parameters	980-PSPE-08A	980-PSPE-08B	980-PSPE-08C	980-PSPE-08D
Number of channels	8	8	8	8
Cartridge volume :	1、3、6 mL SPE	1、3、6 mL SPE	3、6、12 mL SPE	3、6、12 mL SPE
Material of casing:	ABS	ABS	ABS	ABS
System control:	Single-chip Microcomputer	Single-chip Microcomputer	Single-chip Microcomputer	Single-chip Microcomputer
Maximum pressure:	5 bar	5 bar	5 bar	5 bar
Power source:	100-240 V	100-240 V	100-240 V	100-240 V
Input voltage:	12 V	12 V	12 V	12 V
Power consumption:	< 6 A (at 12 VDC)	< 6 A (at 12 VDC)	< 6 A (at 12 VDC)	< 6 A (at 12 VDC)
Weight (Kg):	3	3.5	3	3.5
Dimension (cm):	28 x 20 x 18	28 x 20 x 18	28 x 20 x 18	28 x 20 x 18

Part No. / Parameters	980-PSPE-12A	980-PSPE-12B	980-PSPE-12C	980-PSPE-12D
Number of channels	12	12	12	12
Cartridge volume :	1、3、6 mL SPE	1、3、6 mL SPE	3、6、12 mL SPE	3、6、12 mL SPE
Material of casing:	ABS	ABS	ABS	ABS
System control:	Single-chip Microcomputer	Single-chip Microcomputer	Single-chip Microcomputer	Single-chip Microcomputer
Maximum pressure:	6 bar	6 bar	6 bar	6 bar
Power source:	100-240 V	100-240 V	100-240 V	100-240 V
Input voltage:	12 V	12 V	12 V	12 V
Power consumption:	< 7 A (at 12 VDC)	< 7 A (at 12 VDC)	< 7 A (at 12 VDC)	< 7 A (at 12 VDC)
Weight (Kg):	5	5.5	5	5.5
Dimension (cm):	40 x 28 x 20	40 x 28 x 20	40 x 28 x 20	40 x 28 x 20

Please visit English website http://chiraltek-column.com/Downloads.ph for downloading the updated and latest version of the product manual. Please call an international phone number (+65)-93656129 to directly contact ChiralTek team in Singapore for price enquiry or technical support. You also can call a special local phone number (+86)-95040358310 in the mainland of China to directly contact ChiralTek team in Singapore.

8. Order Information

Table2. The order information of the typical eight models of PSPE systems

Specifications and order information of ChiralTek PSPE systems		
Part No.	Specifications and descriptions	Remarks
980-PSPE-08A	Single-chip microcomputer-controlled air pump-driven P-SPE-08A mainframe with 8-channel rack for 6mL, 3mL, and 1mL SPE cartridges, suitable for small volume samples (0.1mL-6*N mL/when repeating sample loading procedure for N times), manual sample loading.	100~240V external power supply
980-PSPE-08B	Single-chip microcomputer-controlled air pump-driven P-SPE-08B mainframe with 8-channel rack for 6mL, 3mL, and 1mL SPE cartridges, suitable for both small and large volume samples, automatic loading large volume samples (no upper volume limit).	100~240V external power supply
980-PSPE-08C	PSingle-chip microcomputer-controlled air pump-driven P-SPE-08C mainframe with 8-channel rack for12mL, 6mL, and 3mL SPE cartridges, suitable for small volume samples (0.2mL-12*N mL/when repeating sample loading procedure for N times), manual sample loading.	100~240V external power supply
980-PSPE-08D	Single-chip microcomputer-controlled air pump-driven P-SPE-08D mainframe with 8-channel rack for 12mL, 6mL, and 3mL SPE cartridges, suitable for both small and large volume samples, automatic loading large volume samples (no upper volume limit).	100~240V external power supply
980-PSPE-12A	Single-chip microcomputer-controlled air pump-driven P-SPE-12A mainframe with 12-channel rack for 6mL, 3mL, and 1mL SPE cartridges, suitable for small volume samples (0.1mL-6*N mL/when repeating sample loading procedure for N times), manual sample loading.	100~240V external power supply
980-PSPE-12B	Single-chip microcomputer-controlled air pump-driven P-SPE-12B mainframe with 12-channel rack for 6mL, 3mL, and 1mL SPE cartridges, suitable for both small and large volume samples, automatic loading large volume samples (no upper volume limit).	1100~240V external power supply
980-PSPE-12C	Single-chip microcomputer-controlled air pump-driven P-SPE-12C mainframe with 12-channel rack for 12mL, 6mL, and 3mL SPE cartridges, suitable for small volume samples (0.2mL-12*N mL/when repeating sample loading procedure for N times), manual sample loading.	100~240V external power supply
980-PSPE-12D	Single-chip microcomputer-controlled air pump-driven P-SPE-12D mainframe with 12-channel rack for 12mL, 6mL, and 3mL SPE cartridges, suitable for both small and large volume samples, automatic loading large volume samples (no upper volume limit).	100~240V external power supply

ChiralTek Pte Ltd
3 Soon Lee Street
#04-06 Pioneer Junction
Singapore 627606

Tel: (+86)-95040358310
Mobile：(+65)-93656129
Fax： (+65)-67957219
Emails:
sales@chiraltek-column.com
support@chiraltek-column.com