

## UHPLC Instrument Qualification with the Chemical Solutions Kits - Tech Information

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The Chemical Solutions™ HSQ™ and PQ™ Qualification Kits are fully compatible with UHPLC systems, just as they are with conventional HPLC instruments.

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### Understanding the Compatibility

While UHPLC (Ultra High-Performance Liquid Chromatography) systems operate at higher pressures and often use smaller particle columns, the fundamental principles of qualification remain the same as with HPLC. That means:

- Detector linearity
- Wavelength accuracy
- Injection precision
- Flow rate verification

...are all tested in the same way, regardless of whether you're using HPLC or UHPLC.

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### Using the HPLC Qualification Kits with UHPLC

- All of the test protocols provided for in the kit accurately measure the performance of a system, regardless of whether it is a UHPLC, UPLC or HPLC.
- The protocols uses a flow rate of 2.0 mL/min.
- Most UHPLC pumps can handle this flow rate. If yours cannot, you can lower the flow rate and still perform the qualification, with the following changes
  - The expected retention times must be revised and entered into the software, e.g. @1 mL/min, the tR window for Caffeine becomes 2-3 min, instead of 1.0 – 1.5 min
  - The gradient qualification profile times must be modified the same as for the retention times. Contact technical support for help on this if needed.
- The standard 5 µm column included in the kit is suitable for UHPLC use and does not require replacement with a sub-2 µm column.
  - If it is desired to qualify the UHPLC using smaller columns and different flow rates, the same fundamental test protocols and materials are valid and can be used. Only the specific operating conditions are modified. Depending upon the changes desired, the provided software should be able to accommodate these variations. If not, you can write custom templates within you own data system (Empower, OpenLab, Chromelion, etc.), which can be approved and validated by your QA group). The solutions provided can still save countless hours of materials preparation and validation, and then can be used in your own custom templates as the basis of your in-house instrument qualification program. Again, contact our Technical Support for help if you want to create custom qualification conditions.

- Even though UHPLC systems are capable of much higher pressures, the supplied column (~ 150 bar) is still well within the design range of a typical UHPLC, and provides valid qualification results.
- The nominal injection volume for testing is 10 $\mu$ L. However, as described in the Operating Instructions, this volume may be changed as needed such that the highest peak (the L6 injection) remains within the desired test range of the detector. This will represent the upper range of the detector Absorbance Linearity measured. Likewise, if your injector is used primarily with small injection volumes of 1 $\mu$ L and has a maximum injection volume of 50 $\mu$ L, you would space the injection volume linearity test over the desired lower and upper injection volumes allowed on your instrument, and choose a different volume for the precision tests. You would enter these values into the provided software along with their corresponding areas and heights.

## **Adjustments You May Need to Make**

- You may need to adjust the injection volume to achieve optimal peak heights for your detector.
- No need to switch to a 1.7  $\mu$ m or smaller particle column — the included column is sufficient for qualification purposes.

## **Summary**

Feature	HPLC UHPLC	
Compatible with HSQ™/PQ™ Kits	✓	✓
Requires special column other than what is supplied?	✗	✗
Flow rate flexibility	✓	✓
NIST-traceable standards	✓	✓

Click [HERE](#) for PQ & HSQ Kit ordering information and product images

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