

VPE Software: Quick Slope Zero Slope Update

Abstract: This document provides details on an optional update to the SoloVPE Software, specifically related to the Quick Slope utility and how it processes measurements of “Zero Slope” samples or those measurements with no discernible pathlength dependent absorbance response.

Applicability: This article applies the Quick Slope utility exclusively.

Symptom: Quick Slope intermittently moves to collect the shortest possible pathlengths during data acquisition on a sample which has no pathlength dependence.

Cause: The behavior is caused by “zero” slope measurements during which the response of the system during Section data acquisition is essentially characterizing the baseline noise level of the system. This can occur when making measurements on blanks or at wavelengths where there is no pathlength dependent absorbance response, such as at a scatter wavelength. The noise response will result in a small slope value, either positive or negative, with a poor R-Squared value. The negative slope condition will cause the system to drive to shorter pathlengths^[01].

Detailed Info:

The Quick Slope utility is a simple but powerful capability that relies on the *Slope Spectroscopy*® technique made possible by the SoloVPE™ System. While fundamentally a UV method based upon the Beer-Lambert Law, it differs from traditional methods by not relying on absolute absorbance measurements and instead makes measurements of the linear slope of Section (Absorbance vs. Pathlength) data. The slope of a Section plot is directly proportional to the concentration of the sample being measured as described by the *Slope Spectroscopy Equation* ($m = \epsilon c$).

The capability is made possible by the variable pathlength technology of the SoloVPE system which can make measurements at a wide range of pathlengths. The Quick Slope utility is simple and powerful because it automatically characterizes the sample to identify, measure and analyze the optimal pathlength range to ensure that the data is compliant with the Beer-Lambert Law. This adaptive technology requires the SoloVPE System to perform a preliminary investigation the sample in order to determine the most appropriate pathlengths at which to acquire the Section data which is then analyze using linear regression to determine the slope value.

As is the case with any measurement system, if there is “nothing” being measured the system will report nothing or in the case of an electronic system such as spectrophotometer the response of the system will reflect a noise level response. In the case of the SoloVPE, a measurement that results in a Zero Slope Condition that reflects no pathlength dependence of the sample as would be case with the measurement of a blank the system will report a slope that is very close to zero which can be a small positive or negative number. Since this noise response is not strongly correlated to the pathlength at which is data is collected, poor R² values are to be expected.

The software update being described in this article adapts the Quick Slope utility to handle this type of measurement more consistently for those customer that choose to use the Quick Slope feature to acquire Section Data and slope values on samples that can realistically not be expected to display a pathlength dependent response. Some users of the system have developed methods that rely on offline background or scatter

correction rather than the point by point corrections that are utilized in the Quick Slope software. This update has been prepared to support those customers that choose to use the SoloVPE system in this way.

The software update change only one (1) file on the SoloVPE system: “*vpeQSlope.ADL*”. The minor update simply ensures that the adaptive Quick Slope algorithm behaves in the same way when it encounters either a negative or positive low slope response on its preliminary investigation of the sample. This update can be applied by C Technologies’ Solo Service Direct group, an Authorized Service Provider or the system Owner under the guidance of a SoloVPE technician.

To ask questions or receive the update please contact Solo Service Direct +(US) 908-707-1201, C Technologies, Inc. +(US) 908-707-1009 or your SoloVPE Representative.

Document Info:

Revision History			
Rev	Date	Changes	Initials
00	2014-05-02	Initial Release	MCS
01	2014-07-11	Corrected Type in Cause Paragraph “wavelength” should have been “pathlength”	MCS

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