The Value of Quality

Why is Quality so important to DCG? When we look at our customer base over the last 20 years, and we envision the future of where DCG is headed, the answer is simple. DCG began with the notion of quality for those that value nothing but the finest and best in calibration standards and products. We still hold that opinion today. Now, as we grow with loyal clients who have been with us the whole 20 years to new clients who have just joined DCG, we would like to share with you why it is more important than ever to expect exceptional quality and customer service and to choose DCG's belief in being the best!

What's the cost of bad measurement? $100,000.00, $500,000.00 or maybe more, much more! Look at the penalties for Ultra Low Sulfur Diesel that doesn't meet government sulfur specifications - $35,000 a day for 25 days! That's $875,000 … at minimum. What about the unknown cost of lost revenue caused by bad measurement as a result of not getting full value for your product? Let's say that the Gods of Measurement are looking down on you and have graced you with the perfect measurement system. Your sample points are in the correct place and the sampling system is properly designed. The technician pulls the perfect sample and your analyzer or gas chromatograph is optimized to perfection. What's left that can possibly go wrong? You guessed it, the calibration standard.

Calibration Standards are one of the most important pieces of your measurement puzzle. Despite the importance of a quality calibration standard some people continue to view them as expensive cylinders of gases or ampoules of liquids that serve limited purpose. All calibration standards are the same, aren't they? They're a commodity just like carrier gas or welding gas, right? We get a certificate from the manufacturer that tells us what's in the cylinder, don't we? The answer to these questions are no, no and again sometimes no.

Is there a difference in the quality of standards prepared by different manufacturers or even the same manufacturer? How do you know if you are getting what you paid for? The bottom line is; it all comes down to two things: uncertainties and preparation technique.

There are several ways to prepare a calibration standard - gravimetric, volumetric and pressure blending. Gravimetric blending is the most accurate followed by volumetric and lastly pressure. However, there are different qualities of gravimetric blending available on the market today. Simply weighing in each component does not get you an accurate standard. There are several factors which affect the true gravimetric uncertainty of a calibration standard, they are: raw product impurities, lost mass, the uncertainty of the masses used to calibrate the balances, the uncertainty of the balances used in preparing the

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calibration standard and lastly balance selection. DCG addresses each of these areas of uncertainty when preparing our standards.

Those of you that use DCG's calibration standards might have noticed that our quotations and certificates include a quality statement that reads "Primary Reference Standard, ± 1% or less gravimetric uncertainty per component. NIST Traceable by weight with the gravimetric values verified by one or more analytical techniques - NIST Certificate #'s: 822/266926-02, 822/272801-06, 822/274081-06. Where applicable, this Reference Standard meets or exceeds the following guidelines: ISO 6142, ISO 6143, GPA 2198, API 14.1.6.2 and API 14.1.6.3." This statement assures that you are receiving one of the finest, if not the finest, quality calibration standard available on the market today!

The definition of Primary Reference Standard changes throughout the calibration standard manufacturers industry. That is why DCG has taken the time to define the DCG Primary Reference Standard's actual specifications. These specifications are:

± 1% or less gravimetric uncertainty per component means that the actual gravimetric uncertainty per component is ±1 % or less after addressing the issues of raw product impurities, lost mass, the uncertainty of the masses used to calibrate the balances, the uncertainty of the balances used in preparing the calibration standard and balance selection.

NIST Traceable by weight with the gravimetric values verified by one or more analytical techniques - NIST Certificate #'s: 822/266926-02, 822/272801-06, 822/274081-06 means that the masses used to calibrate DCG's balances are traceable through an unbroken chain to NIST via the above certificate numbers. Each and every DCG calibration standard is analyzed with the gravimetric values verified via one or more analytical techniques.

Where applicable, this Reference Standard meets or exceeds the following guidelines: ISO 6142, ISO 6143, GPA 2198, API 14.1.6.2 and API 14.1.6.3. These technical publications provide detailed instructions on the proper techniques used in the gravimetric preparation and analytical verification of calibration standards.

Why does DCG provide gravimetric values on our certificates versus analytical values? Each of the above technical publications state that the reported values on the certificate are to be gravimetric values that have been analytically verified. There are a number of reasons for this. The most obvious source of analytical uncertainty is the gravimetric uncertainty of the calibration standards used to form the calibration curve combined with the gravimetric uncertainty of the calibration standard being verified. These two sources of uncertainties alone will result in an analytical uncertainty that is

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double that of the gravimetric uncertainty. Another source of analytical uncertainty is the uncertainty associated with the analytical instrument itself. These uncertainties include, but are not limited to, differences in injection volume, detector response, oven temperature variations, peak integration, and column interaction. As a result of these factors, analytical uncertainty can be no better than double the gravimetric uncertainty and frequently much more than double. This is why DCG uses gravimetric values on our certificates and not analytical values.

ISO 6142 and ISO 6143 are in-depth technical publications that address how to properly prepare a gravimetric calibration standard and how to verify a properly prepared calibration standard through instrumental analysis. **API 14.1.6.2 and API 14.1.6.3** address best practice issues when preparing a calibration standard. **GPA 2198** addresses among other issues, the preparation of Natural Gas and Liquid Natural Gas Reference Standards. One thing that each of these publications clearly states is that a calibration standard is to be gravimetrically prepared with the gravimetric values verified by analysis. This is why DCG's certificates are labeled Certificates of Concentration not Certificates of Analysis.

DCG stands apart from the competition because we have taken the time to define our Primary Reference Standards and to make a point to address every source of uncertainty in that definition. Every effort has been made to make the highest quality standard possible, from the highest quality raw materials to the experienced chemists performing the blending and analysis. This attention to detail is why DCG is The Premier Manufacturer of Calibration Standards and Reference Materials.

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