

## DCG Quality Statement

DCG's Primary Reference Standard's specifications are:

**± 1% or less gravimetric uncertainty per component** means that the actual gravimetric uncertainty per component is  $\pm 1\%$  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 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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Chromatographic Reference Materials