

# APPLICATION NOTE

# LD15-08



## Measurement of impurities in UHP helium using MultiDetek2 and PlasmaDetek2



▲ MultiDetek2

▲ PlasmaDetek2

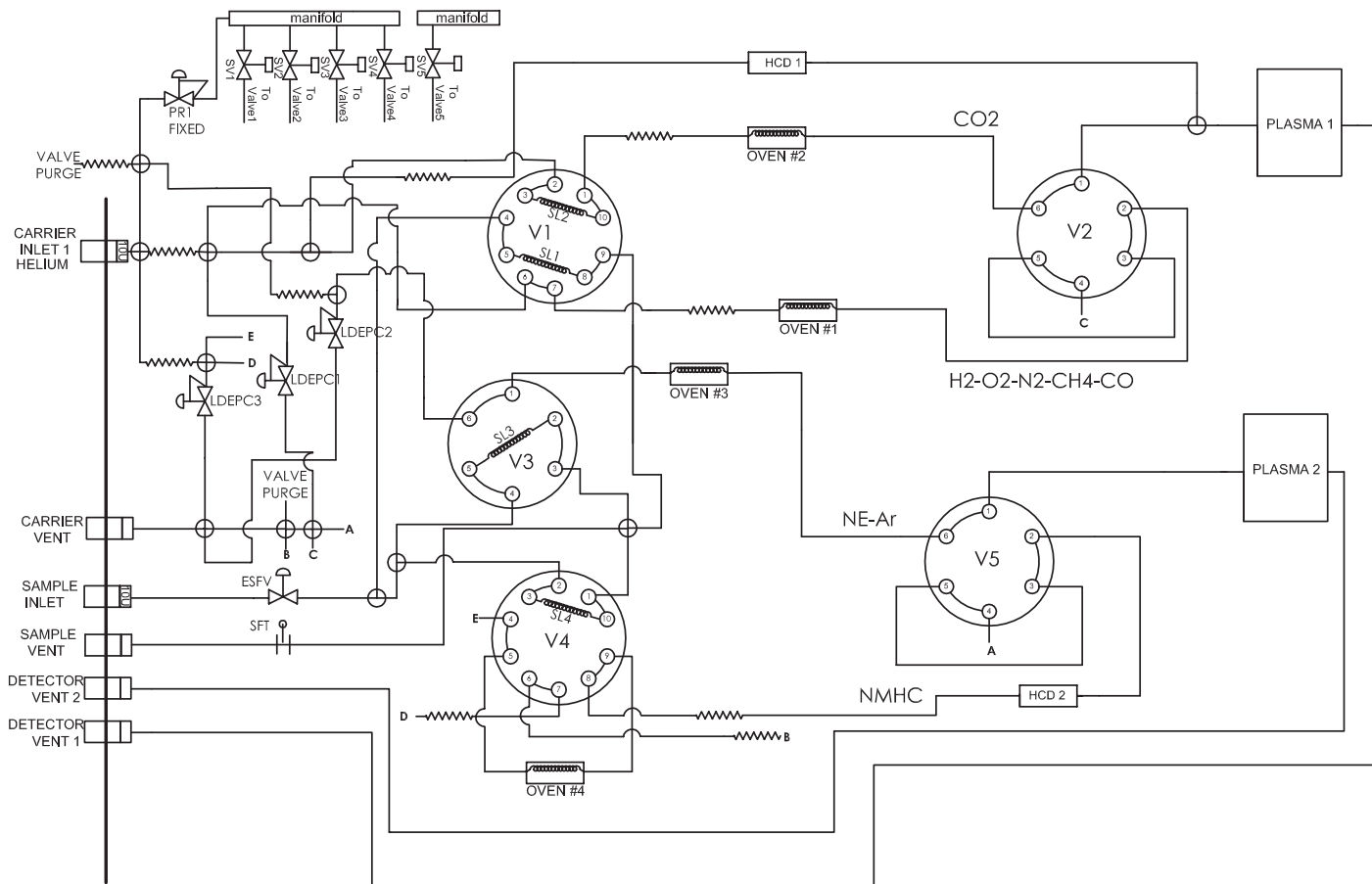
Helium is a widely used gas in different needs such as cryogenics, pressurizing and purging, welding, controlled atmospheres, leak detection and breathing mixtures. Having a good analytical tool is mandatory to ensure the required purity of helium.

The most popular technique for UHP helium analysis is to detect impurities by gas chromatography. But some detection technologies within the GC do not provide the desired detection limit or can simply not measure some critical impurities like neon.

### **LDETEK SOLUTION:**

The MultiDetek2 combined with the PlasmaDetek2 detector provides an ideal solution to measure the different impurities in UHP helium. With the PlasmaDetek2, based on plasma emission detection, impurities in low ppb can be detected, even neon. The discharge ionisation detector (DID) can simply not detect neon or require a different operation mode to achieve ppm measurement. Which is not enough for many helium producers where they need lower detection limit in ppb. The operation is also more complex since the ionisation voltage needs to be changed when neon has to be detected.

LDetek solution gives an easy system to use with very good sensitivity. Figure 1 shows such configuration.



**Figure 1**

Two plasma cells are used to reduce the number of selection valves. Simultaneous injection in both plasmas is possible to accelerate analysis time. The parallel analysis feature within the MultiDetek2 software can be enabled to give the opportunity to acquire two chromatograms at the same time.

Neon and argon are measured within the same channel using the argotek column from LDetek. Such column gives a true argon peak by separating O2 and argon completely. Be sure to check application note LD12-3 on our website for more details. It also makes possible the measurement of neon against H2.

When using the PlasmaDetek2 technology, different optical filters are used to ensure true measurement of the components when interference can occur. For example, O2 is measured accurately against argon by using a specific optical filter giving a signal specifically to O2 and not argon.

figure 2 shows a chromatogram of such system with a standard gas.

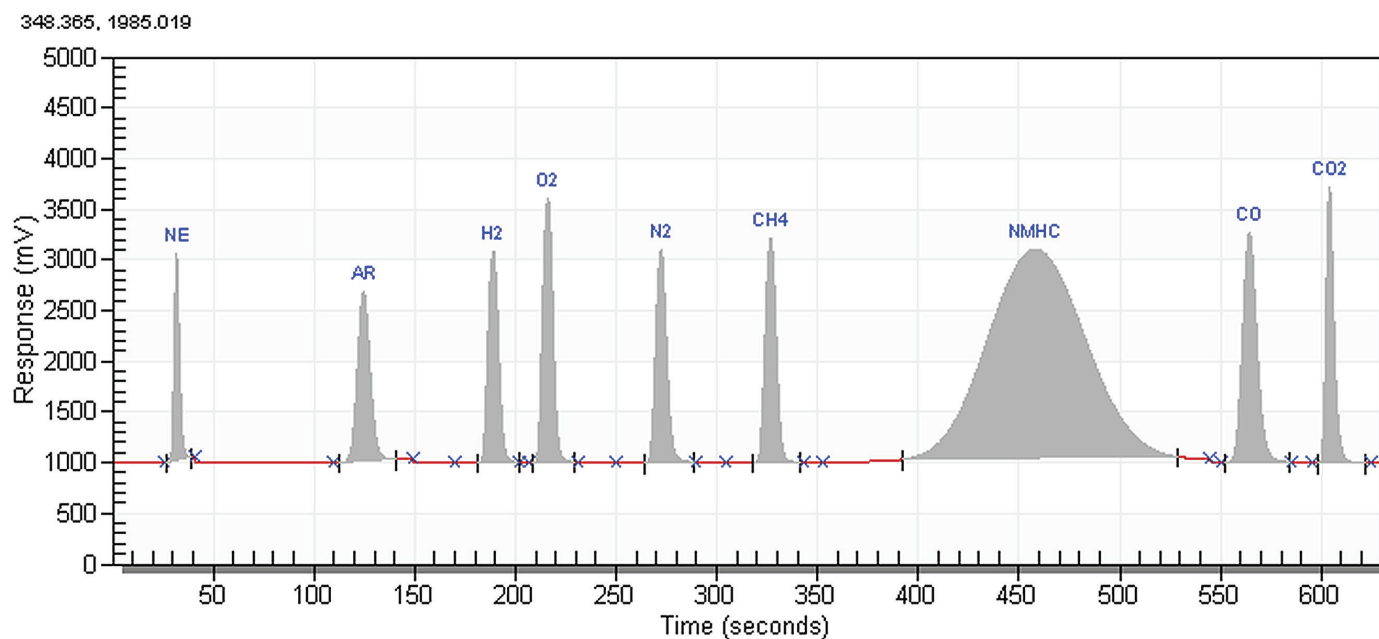


Figure 2

Based on noise to ratio, LDL is calculated as follows:

| COMPONENT       | CONCENTRATION | PEAK HEIGHT | NOISE | LDL (3X NOISE) |
|-----------------|---------------|-------------|-------|----------------|
| Ne              | 4.8 ppm       | 3010 mV     | 2 mv  | 0.009 ppm      |
| Ar              | 4.1 ppm       | 2720 mV     | 2 mv  | 0.009 ppm      |
| H <sub>2</sub>  | 5.5 ppm       | 3120 mV     | 2 mv  | 0.011 ppm      |
| O <sub>2</sub>  | 6.2 ppm       | 3552 mV     | 2 mv  | 0.010 ppm      |
| N <sub>2</sub>  | 5.4 ppm       | 3099 mV     | 2 mv  | 0.010 ppm      |
| CH <sub>4</sub> | 5.5 ppm       | 3254 mV     | 2 mv  | 0.010 ppm      |
| NMHC            | 4.6 ppm       | 3101 mV     | 3 mv  | 0.007 ppm      |
| CO              | 5.4 ppm       | 3331 mV     | 2 mv  | 0.013 ppm      |

Note: other LDL could be obtained with different injection volume and chromatographic condition

## COMPLETE SOLUTION:

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Our Helium purity analysis offers a complete cabinet solution including the MultiDetek2 compact GC system, the LDGSS ultra high purity remote stream selector system, the LDP1000 carrier gas purifier and the moisture analysis instrument all integrated in one cabinet. The stream selector can be manually controlled using the front switch or can be remotely controlled with the MultiDetek2. A pre programmed sequence can also be done with LDGSS. The moisture analysis is re-directed to the MultiDetek2 analog input. This way, all data can be managed by MultiDetek2 using one channel communication protocol. The system is pre-configured and certified by experts at LDetek facility before shipping.



## CONCLUSION:

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Using both the PlasmaDetek2 and the MultiDetek2, only one system can measure all permanent gases with the sensitivity required. No need of additional oxygen analyzer or other setup for neon measurement. Furthermore, with the LDetek technology this maintenance free system avoids any trap or scrubber for the argon impurity.



Where **innovation** leads to **success**

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