

DATA BULLETIN

Analysis of USADA steroid certified reference materials

To be compliant with WADA technical document TD2016IRMS, it is compulsory that the GC-C-IRMS system is calibrated periodically against a steroid Certified Reference Material, for example USADA-33 or USADA-34, which are traceable to the internationally defined reference scales (for example, VPDB for carbon isotope ratio measurements).

Here we present the results of USADA 34-2 and USADA35-1 which have been analyzed with the Anthro**vision** GC-C-IRMS system at our demonstration laboratory at Isoprime House, UK. Each of the standard mixtures have been supplemented with octacosane as an internal standard quality check.

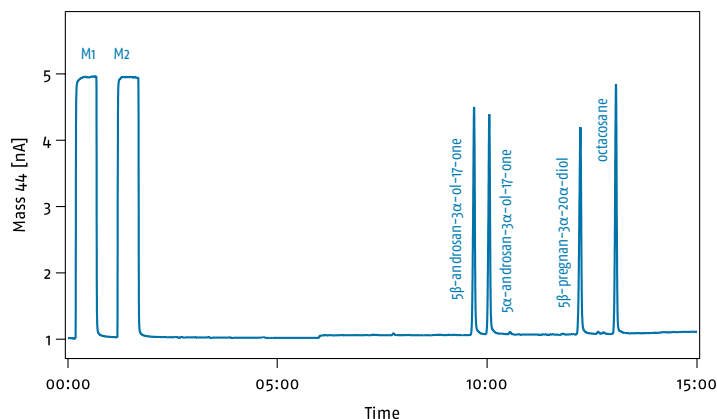


Figure 1. Typical chromatogram of USADA34-2 (analyzed using a 30m DB-5MS,0.25mm, 0.25µm column).

OVERVIEW

Analysis of steroid certified reference materials according to the WADA technical documents TD2016IRMS with excellent results



Table 1. Results from the analysis of USADA34-2

COMPOUND	INJECTION 1 $\delta^{13}\text{C}$ [‰]	INJECTION 2 $\delta^{13}\text{C}$ [‰]	INJECTION 3 $\delta^{13}\text{C}$ [‰]	AVERAGE $\delta^{13}\text{C}$ [‰]	SD [‰]	CERTIFIED VALUE $\delta^{13}\text{C}$ [‰]
5β-androsan-3α-ol-17-one	-28.90	-28.96	-28.87	-28.91	0.05	-28.91 ± 0.11
5α-androsan-3α-ol-17-one	-26.95	-27.05	-27.06	-27.02	0.06	-27.02 ± 0.18
5β-pregnan-3α-20α-diol	-31.27	-31.22	-31.15	-31.21	0.06	-31.51 ± 0.10
octacosane	-27.56	-27.59	-27.51	-27.55	0.04	n/a

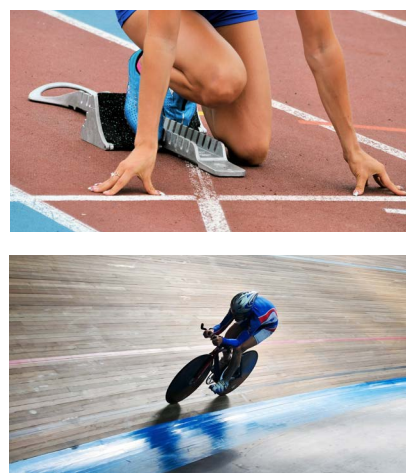
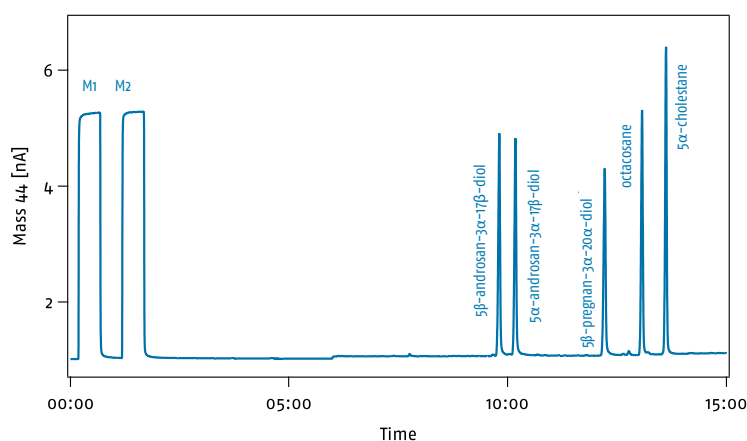


Figure 2. Typical chromatogram of USADA35-1 (analyzed using a 30m DB-5MS, 0.25mm, 0.25µm column).

Table 2. Results from the analysis of USADA35-1

COMPOUND	INJECTION 1 $\delta^{13}\text{C}$ [‰]	INJECTION 2 $\delta^{13}\text{C}$ [‰]	INJECTION 3 $\delta^{13}\text{C}$ [‰]	AVERAGE $\delta^{13}\text{C}$ [‰]	SD [‰]	CERTIFIED VALUE $\delta^{13}\text{C}$ [‰]
5β-androsan-3α-17β-diol	-29.12	-29.03	-29.09	-29.08	0.05	-29.98 ± 0.09
5α-androsan-3α-17β-diol	-30.65	-30.66	-30.84	-30.72	0.11	-30.52 ± 0.12
5β-pregnan-3α-20α-diol	-19.02	-19.26	-19.10	-19.13	0.12	-18.53 ± 0.12
5α-cholestane	-25.14	-25.14	-25.15	-25.15	0.01	-24.92 ± 0.11
octacosane	-27.54	-27.61	-27.55	-27.57	0.04	n/a

Conclusion

The analysis of steroid certified reference materials ensures that the GC-C-IRMS system is calibrated to international reference scales thereby confirming the accuracy of the instrument and thus the ability for different laboratories to independently compare results. The analysis of USADA34-2 and USADA35-1 by Anthro**VISION** demonstrates the excellent precision and accuracy of the instrument. The octacosane standard demonstrates the exceptional precision throughout the analysis.

References

WADA Technical Document (TD2016IRMS), Detection of synthetic forms of endogenous anabolic androgenic steroids by GC/C/IRMS. <https://www.wada-ama.org/en/resources/science-medicine/td2016-irms>

Acknowledgement

Elementar would like to thank the [Institute of doping analysis und sports biochemistry Dresden](#) in Kreisha, Germany for providing the steroid standards.

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