



Australian Government  
Department of Industry,  
Science and Resources

**National  
Measurement  
Institute**



# **WADA & PCC funded Reference Materials Catalogue December 2023**

*Quality reference materials for identification and calibration are essential to making accurate chemical measurements in sport doping control.*

Category	Description	NMI reference	Unit of issue (mg)	Domestic Cost (A\$) (excl GST)	International Cost (A\$)
<b>Steroids and steroid metabolite</b>					
1-Androstendione	1-Androstendione (5 $\alpha$ -Androst-1-en-3,17-dione) *	D845	1 (ampoule)	228	319
Danazol metabolites	2 $\alpha$ -Hydroxymethylethisterone †	D920b	1 (ampoule)	121	169
Finasteride metabolites	Carboxy finasteride †	S045	1 (ampoule)	121	169
4-Hydroxy steroids	4-Hydroxy-estr-4-en-3,17-dione †	S043	1 (ampoule)	121	169
4-Hydroxy steroids	1,6,7-d $\alpha$ -4-Hydroxyandrostendione	S046	0.2 (ampoule)	121	169
17 $\alpha$ -Methylclostebol metabolite	4-Chloro-17 $\alpha$ -methyl-androst-4-ene-3 $\alpha$ , 17 $\beta$ -diol †	S044	1 (ampoule)	121	169
Methyldienolone	Methyldienolone †	D916b	1 (ampoule)	121	169
7 $\alpha$ -Methylnandrolone and metabolites	7 $\alpha$ -Methylnandrolone	S048	1 (ampoule)	121	169
7 $\alpha$ -Methylnandrolone and metabolites	7 $\alpha$ -Methyl-5 $\beta$ -estran-3 $\alpha$ -ol-17-one (major metabolite) *	S047	1 (ampoule)	121	169
7 $\alpha$ -Methylnandrolone and metabolites	7 $\alpha$ -Methyl-estr-4-ene-3 $\alpha$ -ol-17-one (minor metabolite) *	S050	1 (ampoule)	121	169
Nandrolone metabolites	19-Noretiocholanolone sulfate (Na salt)*	D849	Exhausted	121	169
Nandrolone metabolites	Epinandrolone sulfate <sup>†</sup> TEA salt	D783b	5	121	169
Norbolethone and metabolites	Norbolethone <sup>†</sup> (13 $\beta$ ,17 $\alpha$ -Diethyl-gonan-4-ene-17 $\beta$ -ol-3-one)	D825c	1 (ampoule)	121	169
Norbolethone and metabolites	13 $\beta$ ,17 $\alpha$ -Diethyl-5 $\beta$ -gonane-3 $\alpha$ , 17 $\beta$ -diol (major metabolite) †	D818b	1 (ampoule)	121	169
Norbolethone and metabolites	13 $\beta$ ,17 $\alpha$ -Diethyl-5 $\alpha$ -gonane-3 $\alpha$ , 17 $\beta$ -diol (minor metabolite) †	D820b	1 (ampoule)	121	169
Testosterone metabolites (including internal standards)	5 $\beta$ -Androstane-3 $\alpha$ ,17 $\beta$ -diol-3- $\beta$ -glucuronic acid †	S003b	1	155	218
Testosterone metabolites (including internal standards)	d4-5 $\alpha$ -Androstan-3 $\alpha$ ,17 $\beta$ -diol-17-O- $\beta$ -glucuronic acid *	S009	1	121	169
Testosterone metabolites (including internal standards)	d4-5 $\alpha$ -Androstan-3 $\alpha$ ,17 $\beta$ -diol-3-O- $\beta$ -glucuronic acid *	S010	1	121	169
Testosterone metabolites (including internal standards)	d3-5 $\beta$ -Androstan-3 $\alpha$ ,17 $\beta$ -diol-17-O- $\beta$ -glucuronic acid *	S011	1	121	169
Testosterone metabolites (including internal standards)	d5-5 $\beta$ -Androstan-3 $\alpha$ ,17 $\beta$ -diol-3-O- $\beta$ -glucuronic acid *	S012	1	121	169

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<b>Steroids and steroid metabolite</b>					
Testosterone metabolites (including internal standards)	d4-Epitestosterone-17-O- $\beta$ -glucuronic acid *	S023	1 (ampoule)	121	169
Testosterone metabolites (including internal standards)	d5-Etiocholanolone-3-O- $\beta$ -glucuronide sodium salt *	S020	1 (ampoule)	121	169
1-Testosterone*	5 $\alpha$ -Androst-1-ene-3 $\alpha$ -ol-17-one* (Ampouled)	D832	0.2 (ampoule)	121	169
Oral Turinabol metabolite	6 $\beta$ -Hydroxy-oral turinabol †	D615b	1 (ampoule)	121	169
Prohormones and metabolites	3 $\alpha$ ,5-Cyclo-5 $\alpha$ -androst-6 $\beta$ -ol-17-one †	S039	1 (ampoule)	121	169
Prohormones and metabolites	16 $\alpha$ -Hydroxyandrosterone *	D843	1 (ampoule)	121	169
Prohormones and metabolites	6 $\beta$ -Hydroxyetiocholanolone *	D867	1 (ampoule)	121	169
Prohormones and metabolites	4 $\beta$ -Hydroxy DHEA *	D834	1 (ampoule)	121	169
Prohormones and metabolites	7-Keto DHEA *	D833	10	121	169
Prohormones and metabolites	7 $\alpha$ -Hydroxy DHEA *	D875	1 (ampoule)	121	169
Prohormones and metabolites	7 $\beta$ -Hydroxy DHEA *	D865b	1 (ampoule)	121	169
Prohormones and metabolites	16 $\beta$ -Hydroxy DHEA *	D844	1	121	169
Prohormones and metabolites	3 $\alpha$ -Hydroxy-4-estren-17-one *	D873	1	121	169
Prohormones and metabolites	3 $\beta$ -Hydroxy-4-estren-17-one *	D866	1	121	169
Anti-inflammatory metabolites	$\alpha$ -Hydroxycarprofen†	D1072	5	121	169
REV-ERB agonist SR9009 metabolites	N-[(4-Chlorophenyl)methyl]-5-nitro-2-thiophenemethanamine hydrochloride†	D1066	1 (ampoule)	121	169
REV-ERB agonist SR9009 metabolites	Ethyl N-(5-nitro-2-methylthiophene)-3-aminomethylpyrrolidine-1-carboxylate†	D1067	Exhausted	121	169
Stimulants	Formoterol fumarate†	D1065	25	121	169
Stimulants	Higenamine hydrochloride†	D1070	25	121	169

Category	Description	NMI reference	Unit of issue (mg)	Domestic Cost (A\$) (excl GST)	International Cost (A\$)
Steroids and steroid metabolite					
Steroid carbon isotope ratio standard mixture reference material for GCC-IRMS	Carbon isotope delta value reported for 5 $\alpha$ -androstano-3 $\beta$ -ol acetate ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰} -32.00 \pm 0.09$ ), 5 $\alpha$ -androstano-3 $\alpha$ -ol-17-one acetate ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰} -32.58 \pm 0.03$ ), 5 $\beta$ -androstano-3 $\alpha$ -ol-11,17-dione acetate ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰} -16.50 \pm 0.03$ ), and 5 $\alpha$ -cholestane ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰} -24.90 \pm 0.05$ ) †	CU-PCC 33-2	Ampoule	121	169
Steroid carbon isotope ratio standard mixture reference material for GCC-IRMS	Carbon isotope delta value reported for 5 $\beta$ -androstano-3 $\alpha$ -ol-17-one ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰} -28.75 \pm 0.01$ ), 5 $\alpha$ -androstano-3 $\alpha$ -ol-17-one ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰} -26.74 \pm 0.03$ ), 5 $\beta$ -pregnan-3 $\alpha$ , 20 $\alpha$ -diol ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰} -18.65 \pm 0.03$ ) †	CU-PCC 34-3	Ampoule	121	169
Steroid carbon isotope ratio standard mixture reference material for GCC-IRMS	Carbon isotope delta value reported for 5 $\alpha$ -androstano-3 $\alpha$ -ol-17-one ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰} -27.09 \pm 0.07$ ) †	CU-PCC 40-1	Ampoule	121	169
Steroid carbon isotope ratio standard mixture reference material for GCC-IRMS	Carbon isotope delta value reported for 5 $\alpha$ -androstano-3 $\alpha$ -ol-17-one acetate ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰} -32.82 \pm 0.02$ ) †	CU-PCC 41-1	Ampoule	121	169
Steroid carbon isotope ratio standard mixture reference material for GCC-IRMS	Carbon isotope delta value reported for 5 $\alpha$ -cholestane ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰} -25.03 \pm 0.01$ ) †	CU-PCC 42-1	Ampoule	121	169
Steroid carbon isotope ratio standard mixture reference material for GCC-IRMS	Carbon isotope delta value reported for 5 $\alpha$ -androstano-3 $\alpha$ -ol-17-one acetate ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰} -32.73 \pm 0.06$ ), 5 $\beta$ -androstano-3 $\alpha$ , 17 $\beta$ -diacetate ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰} -30.19 \pm 0.07$ ), 5 $\alpha$ -cholestane ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰} -24.83 \pm 0.13$ ), and 5 $\beta$ -pregnan-3 $\alpha$ , 20 $\alpha$ -diacetate ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰} -21.16 \pm 0.08$ ) †	CU-PCC 44-1	Ampoule	121	169
Steroid Matrix Reference Material	Mass fraction of 19-Norandrosterone (221.4 ng/g) in 1,2-dimethoxyethane (1 mL) *	MX003	Ampoule	182	266

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Steroid Matrix Reference Material	Carbon Isotope Delta Value ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰}$ ) of 19-norandrosterone ( $-29.7 \pm 0.8$ ) in Water containing 20% Methanol 1 (mL)*	MX016	Ampoule	264	370
Steroid Matrix Reference Material	Mass fraction of testosterone metabolites in freeze dried human urine: 5 $\alpha$ -androstane-3 $\alpha$ -17 $\beta$ -diol ( $41.2 \pm 1.8$ ng/g), 5 $\beta$ -androstane-3 $\alpha$ -17 $\beta$ -diol ( $66.0 \pm 2.9$ ng/g), androsterone $1652 \pm 29$ ng/g, etiocholanolone ( $1359 \pm 34$ ng/g), testosterone ( $88.1 \pm 4.2$ ng/g), epitestosterone ( $21.9 \pm 1.0$ ng/g), T/E mass ratio ( $4.03 \pm 0.26$ )*	MX017i	Bottle	396	554
Steroid Matrix Reference Material	Carbon Isotope Delta Value ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰}$ ) in freeze dried human urine: 19-norandrosterone ( $-29.82 \pm 0.41$ )*, Etiocholanolone ( $-23.60 \pm 0.51$ ), Androsterone ( $-22.27 \pm 0.57$ ), Testosterone ( $-27.48 \pm 0.73$ ), Epitestosterone ( $-23.74 \pm 0.80$ ), 5 $\alpha$ -androstane-3 $\alpha$ ,17 $\beta$ -diol ( $-23.83 \pm 0.90$ ), 5 $\beta$ -androstane-3 $\alpha$ ,17 $\beta$ -diol ( $-23.76 \pm 0.61$ ), 11-oxoetiocholanolone ( $-22.23 \pm 0.48$ ), 11 $\beta$ -hydroxyandrosterone ( $-22.38 \pm 0.64$ ), Pregnanediol ( $-22.79 \pm 0.77$ ), 16-androstenol ( $-22.51 \pm 0.60$ )	MX017ii	Bottle	396	554

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Steroids and steroid metabolite					
Steroid Matrix Reference Material	Carbon Isotope Delta Value ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰}$ ). Three ampoules containing dry steroid mixtures. The ampoules contain approximately 400 $\mu\text{g}$ of each steroid with the exception of 16-androstenol supplied close to 280 $\mu\text{g}$ . <b>Vial 1:</b> etiocholanolone (-27.94 $\pm$ 0.24), androsterone (-27.79 $\pm$ 0.21), 11-oxoetiocholanolone (-13.58 $\pm$ 0.23), testosterone (-27.87 $\pm$ 0.24), 11 $\beta$ -hydroxyetiocholanolone (-29.51 $\pm$ 0.36) <b>Vial 2:</b> 5 $\beta$ -androstane-3 $\alpha$ -17 $\beta$ -diol (-29.86 $\pm$ 0.16), 5 $\alpha$ androstane-3 $\alpha$ -17 $\beta$ -diol (-31.14 $\pm$ 0.24), pregnanediol (-16.79 $\pm$ 0.42), epitestosterone (-30.17 $\pm$ 0.36), 11 $\beta$ -hydroxyandrosterone (-28.59 $\pm$ 0.22) <b>Vial 3:</b> 16-androstenol (-30.96 $\pm$ 0.37), dehydroepiandrosterone (-31.63 $\pm$ 0.54), testosterone (-22.52 $\pm$ 0.33) †	MX018	3 Ampoules	264	370
Steroid Matrix Reference Material	Carbon Isotope Delta Value ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰}$ ): Boldenone (-30.38 $\pm$ 0.29) Boldenone* Metabolite 1 (-30.38 $\pm$ 0.29) *	MX020	Ampoule	264	370
Steroid Matrix Reference Material	Carbon Isotope Delta Value ( $\delta^{13}\text{C}_{\text{VPDB}} / \text{‰}$ ): Formestane (-30.71 $\pm$ 0.48)*	MX021	Ampoule	264	370

\*Production funded by the World Anti-Doping Agency.

†Production funded by the Partnership for Clean Competition.

## Restrictions on Issue

The steroid and steroid metabolite reference materials are generally available to WADA accredited laboratories. Laboratories which **do not have** WADA accreditation must provide documented evidence, signed by the company manager, that these materials will not be used for unethical purposes related to commercial human sports drug analysis and that they will not be provided to other laboratories who may be engaged in this analysis.

## NMI Reference Materials

Reference Materials (RMs) produced by NMI are NATA accredited to ISO 17034:2016(E) and prepared in accordance with our accreditation.

RMs have demonstrated homogeneity and stability and are supplied with:

- Product information sheet
- Safety Data Sheet (SDS)

## NMI Certified Reference Materials

Certified Reference Materials (CRMs) produced by NMI have established metrological traceability to the SI unit for mass (kg).

CRMs have certified purity values, stated as a mass fraction with associated uncertainty and are supplied with:

- Certificate of Analysis (CoA)

## Candidate materials

All care is taken in the storage and handling of these materials however they are not independently certified by NMI.

Individual unit issue size varies depending on the amount available and the difficulty of obtaining the

replacement compound. They can be provided with the analytical information available.

## Ampouled Materials

For each ampouled reference material the product information sheet / certificate of analysis will state the mass of analyte dispensed into each ampoule.

## GST charges (Australian customers only)

The prices quoted are EXCLUSIVE of Goods and Services Tax (GST). The current GST rate is 10%. Upon delivery of the requested reference materials NMI will issue valid tax invoices and, if required, adjustment notes as per the requirements of the GST legislation.

## Delivery Fee

Delivery and handling fees apply for all orders and vary with destination. Please check the applicable rates when ordering.

## For further information



+ (612) 9449 0191



chemref@measurement.gov.au



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NMI reference materials available globally through our international partner:

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