

財團法人全國認證基金會 **Taiwan Accreditation Foundation**

Certification Accreditation

(Certificate No: LN2346-221012)

This is to certify that

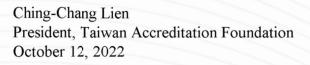
National Measurement Laboratory, R.O.C. National Measurement Laboratory, R.O.C.(Chemical)

321, Sec. 2, Kuang Fu Rd., Hsinchu, Taiwan, R.O.C.

is accredited in respect of laboratory

Accreditation Criteria	:	ISO/IEC 17025:2017; CNS 17025:2018
Accreditation Number	:	N2346
Originally Accredited	:	December 29, 2010
Effective Period	:	December 29, 2020 to December 28, 2025
Accredited Scope	:	Calibration Field, see described in the Appendix
Specific Accreditation	:	Accreditation Program for National Metrology Institutes
Program		

Ching-Chang Lien





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The Appendix forms an integral part of this Certificate, which shall be invalid when use without the Appendix

Accreditation Number : N2346 Laboratory Head : LIN, Tzeng-Yow

calibration items	working standard	calibration method		measurand	level or range	measurement conditions /independent variable	smallest uncertainty		
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KI4000 NO, SO ₂ (Cylinder	Standard gas: NMIs/NO, SO ₂	Component	50	µmol/mol	2000	µmol/mol	NO/N ₂	0.89	µmol/mol
Gas)		Concentration of Cylinder Gas (Document No.: 07-3- 91-0035)	50	µmol/mol	2000	µmol/mol	SO_2/N_2	0.82	µmol/mol
Approval Sign	natory: FENG, Y	un; LIU, Hsin-Wang				· · ·			
KI4000 C ₂ H5OH	Standard gas: NMIs/C ₂ H ₅ OH	*	137	µmol/mol	137	µmol/mol		1.7	µmol/mol
(Cylinder Gas)		Component Concentration of Cylinder Gas	301	µmol/mol	301	µmol/mol		3.2	µmol/mol
		(Document No.: 07-3- 91-0035)	547	µmol/mol	547	µmol/mol		4.3	µmol/mol



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calibration standard		calibration method	I	neasurand 1	evel or rang	ge	measurement conditions /independent variable	smallest uncertainty	
items	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KI4000 CO, CO ₂ ,	Standard gas: NMIs/CO,	Instrument Calibration Technique for the	10	µmol/mol	1000	µmol/mol	СО	0.08	µmol/mo
CH_4, C_3H_8	CO ₂ , CH ₄ ,	Component	100	µmol/mol	1000	µmol/mol	CO ₂	1.1	µmol/mo
(Cylinder Gas)	C ₃ H ₈	Concentration of Cylinder Gas	100	µmol/mol	1000	µmol/mol	CH4	0.9	µmol/mo
		(Document No.: 07-3- 91-0035)	100	µmol/mol	1000	µmol/mol	C3H8	1.0	µmol/mo
Approval Sig	natory: FENG, Y	Zun; LIU, Hsin-Wang							
KI4000	Standard	Instrument	1	µmol/mol	100	µmol/mol	CO/N ₂	1.0	%
$CO, CO_2,$	gas:NMIs/CO,	Certification	> 0.1	mmol/mol	100	mmol/mol	CO/N ₂	0.2	%
$CH_4, C_3H_8,$	CO ₂ , CH ₄ ,	Technique for Filling	100	µmol/mol	1000	µmol/mol	CO_2/N_2	0.2	%
CF4, SF6,	$C_3H_8, CF_4,$	Mass Cylinder Gases	>1	mmol/mol	160	mmol/mol	CO_2/N_2	0.1	%
NO, SO ₂ , O ₂	SF ₆ , NO, SO ₂ ,	and Concentration of	100	µmol/mol	1000	µmol/mol	CH ₄ /N ₂	0.8	%
(Cylinder	O_2	Gas Mixtures –	>1	mmol/mol	100	mmol/mol	CH ₄ /N ₂	0.1	%
Gas)		Gravimetric Method	0.1	mmol/mol	50	mmol/mol	C_3H_8/N_2	0.5	%
		(Document No.: 07-3-	100	µmol/mol	3000	µmol/mol	CF ₄ /N ₂	0.3	%
		A3-0179)	10	µmol/mol	1000	µmol/mol	SF_6/N_2	0.5	%
			50	µmol/mol	2000	µmol/mol	NO/N ₂	0.8	%
			50	µmol/mol	2000	µmol/mol	SO_2/N_2	0.5	%
			1	µmol/mol	10	µmol/mol	O_2/N_2	1.5	%
			1	mmol/mol	10	mmol/mol	O_2/N_2	0.5	%
					250	1/ 1		0.0	
			> 10	mmol/mol	250	mmol/mol	O_2/N_2	0.3	%



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calibration standard		calibration method	n	neasurand le	evel or rang	e	measurement conditions /independent variable		allest ertainty
items	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KI4000	Standard gas:	Instrument Calibration	1000	µmol/mol	10000	µmol/mol	СО	9	µmol/mo
$CO, CO_2,$	NMIs/CO,	Technique for the	> 10000	µmol/mol	200000	µmol/mol	СО	90	µmol/mo
$CH_4, C_3H_8,$	CO ₂ , CH ₄ ,	Component	1000	µmol/mol	10000	µmol/mol	CO_2	12	µmol/mo
O ₂ (Cylinder	C_3H_8, O_2	Concentration of	> 10000	µmol/mol	300000	µmol/mol	CO_2	120	µmol/mo
Gas)		Cylinder Gas	1000	µmol/mol	10000	µmol/mol	CH ₄	8	µmol/mo
		(Document No.: 07-3-	> 10000	µmol/mol	-100000-	µmol/mol	CH ₄	80	µmol/mo
	91-0035)	1000	µmol/mol	10000	µmol/mol	C_3H_8	6	µmol/mo	
			> 10000	µmol/mol	50000	µmol/mol	C ₃ H ₈	60	µmol/mo
			1000	µmol/mol	10000	µmol/mol	O ₂	12	µmol/mo
			> 10000	umol/mol	250000	µmol/mol	O ₂	120	µmol/mo
Approval Sign	l atory: FENG, Y	un; LIU, Hsin-Wang	> 10000	μποι/ποι	230000	μποι/ποι	02	120	μποι/πα
						•			
KI4000	Standard gas:	Instrument Calibration	0.1	cmol/mol	95	cmol/mol	CH ₄	0.18	cmol/mo
KI4000 Synthetic	Standard gas:	Instrument Calibration Technique for the	0.1	cmol/mol cmol/mol	95 10	cmol/mol cmol/mol	CH ₄ C ₂ H ₆	0.18 0.017	cmol/mo
KI4000 Synthetic Natural Gas	Standard gas: NMIs/Synthetic	Instrument Calibration	0.1 0.1 0.1	cmol/mol cmol/mol cmol/mol	95 10 10	cmol/mol cmol/mol cmol/mol	CH4 C2H6 C3H8	0.18 0.017 0.012	cmol/mo cmol/mo cmol/mo
	Standard gas: NMIs/Synthetic	Instrument Calibration Technique for the Component	0.1 0.1 0.1 0.01	cmol/mol cmol/mol cmol/mol cmol/mol	95 10 10 1.0	cmol/mol cmol/mol	CH_4 C_2H_6 C_3H_8 iso-C_4H_{10}	0.18 0.017	cmol/mo
KI4000 Synthetic Natural Gas (Cylinder	Standard gas: NMIs/Synthetic	Instrument Calibration Technique for the Component Concentration of	0.1 0.1 0.1	cmol/mol cmol/mol cmol/mol	95 10 10	cmol/mol cmol/mol cmol/mol cmol/mol	$\begin{array}{c} CH_4 \\ C_2H_6 \\ C_3H_8 \\ iso-C_4H_{10} \\ n-C_4H_{10} \end{array}$	0.18 0.017 0.012 0.0012	cmol/mo cmol/mo cmol/mo
KI4000 Synthetic Natural Gas (Cylinder	Standard gas: NMIs/Synthetic	Instrument Calibration Technique for the Component Concentration of Natural Gas	0.1 0.1 0.1 0.01 0.01	cmol/mol cmol/mol cmol/mol cmol/mol cmol/mol	95 10 10 1.0 1.0	cmol/mol cmol/mol cmol/mol cmol/mol cmol/mol	$\begin{array}{c} CH_4 \\ C_2H_6 \\ C_3H_8 \\ iso-C_4H_{10} \\ n-C_4H_{10} \\ neo-C_5H_{12} \end{array}$	0.18 0.017 0.012 0.0012 0.0012	cmol/mo cmol/mo cmol/mo cmol/mo cmol/mo
KI4000 Synthetic Natural Gas (Cylinder	Standard gas: NMIs/Synthetic	Instrument Calibration Technique for the Component Concentration of Natural Gas (Document No.: 07-3-	0.1 0.1 0.1 0.01 0.01 0.01	cmol/mol cmol/mol cmol/mol cmol/mol cmol/mol cmol/mol	95 10 10 1.0 1.0 0.2	cmol/mol cmol/mol cmol/mol cmol/mol cmol/mol	$\begin{array}{c} CH_4 \\ C_2H_6 \\ C_3H_8 \\ iso-C_4H_{10} \\ n-C_4H_{10} \end{array}$	0.18 0.017 0.012 0.0012 0.0012 0.00013	cmol/ma cmol/ma cmol/ma cmol/ma
KI4000 Synthetic Natural Gas (Cylinder	Standard gas: NMIs/Synthetic	Instrument Calibration Technique for the Component Concentration of Natural Gas (Document No.: 07-3-	0.1 0.1 0.1 0.01 0.01 0.01 0.01	cmol/mol cmol/mol cmol/mol cmol/mol cmol/mol cmol/mol	95 10 10 1.0 1.0 0.2 0.3	cmol/mol cmol/mol cmol/mol cmol/mol cmol/mol cmol/mol	$\begin{array}{c} CH_4 \\ C_2H_6 \\ C_3H_8 \\ iso-C_4H_{10} \\ n-C_4H_{10} \\ neo-C_5H_{12} \\ iso-C_5H_{12} \\ n-C_5H_{12} \\ \end{array}$	0.18 0.017 0.012 0.0012 0.0012 0.00013 0.0005	cmol/mo cmol/mo cmol/mo cmol/mo cmol/mo cmol/mo
KI4000 Synthetic Natural Gas (Cylinder	Standard gas: NMIs/Synthetic	Instrument Calibration Technique for the Component Concentration of Natural Gas (Document No.: 07-3-	0.1 0.1 0.1 0.01 0.01 0.01 0.01 0.01	cmol/mol cmol/mol cmol/mol cmol/mol cmol/mol cmol/mol cmol/mol	95 10 10 1.0 1.0 0.2 0.3 0.3	cmol/mol cmol/mol cmol/mol cmol/mol cmol/mol cmol/mol cmol/mol	$\begin{array}{c} CH_4 \\ C_2H_6 \\ C_3H_8 \\ iso-C_4H_{10} \\ n-C_4H_{10} \\ neo-C_5H_{12} \\ iso-C_5H_{12} \\ n-C_5H_{12} \\ \end{array}$	0.18 0.017 0.012 0.0012 0.0012 0.00013 0.0005 0.0006	cmol/ma cmol/ma cmol/ma cmol/ma cmol/ma cmol/ma

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calibration	working standard	calibration method	n	neasurand le	evel or rang	measurement conditions /independent variable		allest ertainty	
items	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KI6000	Standard gas:	Instrument Calibration	0.0	mol/mol	0.1	mol/mol	СО	2	µmol/mo
Gas Monitor,	NMIs/CO,	Technique for Gas	0	mol/mol	1	mol/mol	CO ₂	6	µmol/mo
Gas Alarm,	$\rm CO_2, CH_4,$	Measurement System	0.00	mol/mol	0.05	mol/mol	CH ₄	59	µmol/mc
Gas Detector	C_3H_8	– Gas Monitor	(0)	(%LEL)	(100)	(%LEL)		(0.1)	(%LEL)
		(Document No.: 07-3-	0.00	mol/mol	0.02	mol/mol	C_3H_8	26	µmol/mo
		91-0072)	(0)	(%LEL)	(100)	(%LEL)		(0.1)	(%LEL)
Approval Sign	atory: FENG, Y	un; LIU, Hsin-Wang							
11 0									
KI6000	Standard gas:	Instrument Calibration	0	%	100	%	$CO_2/N_2(a)$	0.03	%
Gas	NMIs/CO,	Technique for the					(50 to 500) µmol/mol		
Concentration	CO_2, CH_4	Concentration	0	%	100	%	$CO/N_2(a)$	0.02	%
Dilution		Calibration of Gas					(1 to 100) µmol/mol		
Device		Dilutor – Gas	0	%	100	%	CH ₄ /air@	0.15	%
$(CO, CO_2,$		Chromatography					(1000 to 20000) µmol/mol		
CH ₄)		(Document No.:07-3-							
		A3-0185)							
Approval Sign	atory: FENG, Y	un; LIU, Hsin-Wang							
KI7000	Standard gas:	Instrument Calibration	0.0	mol/mol	0.1	mol/mol	СО	2	µmol/mc
Gas Analyzer	NMIs/CO,	Technique for Gas	0		1		00	(1/
	$\rm CO_2, CH_4,$	Measurement System	0	mol/mol	1	mol/mol	CO_2	6	µmol/mo
	C_3H_8	 Gas Monitor 	0.00	mol/mol	0.05	mol/mol	CH ₄	59	µmol/mc
		(Document No.: 07-3-	(0)	(%LEL)	(100)	(%LEL)		(0.1)	(%LEL)
		91-0072)	0.00	mol/mol	0.02	mol/mol	C_3H_8	26	µmol/mc
			(0)	(%LEL)	(100)	(%LEL)		(0.1)	(%LEL)
Approval Sign	atory: FENG, Y	un; LIU, Hsin-Wang							





working standard	calibration method	n	neasurand le	evel or range	e	measurement conditions /independent variable		allest rtainty
brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
Standard gas:	Instrument Calibration	0	%	100	%	CO_2/N_2	0.03	%
NMIs/CO,	Technique for the					(50 to 500) µmol/mol		
CO ₂ , CH ₄	Concentration Calibration of Gas Dilutor – Gas	0	%	100	%	CO/N ₂ @ (1 to 100) μmol/mol	0.02	%
		0	%	100	%	CH4/air @ (1000 to 20000) µmol/mol	0.15	%
	standard brand /model Standard gas: NMIs/CO, CO ₂ , CH ₄	standardmethodbranddocument name/model/no.Standard gas:Instrument CalibrationNMIs/CO,Technique for theCO2, CH4ConcentrationCalibration of GasDilutor – GasChromatography(Document No.: 07-3-	standardmethodmbranddocument nameminimum/model/no.valueStandard gas:Instrument Calibration0NMIs/CO,Technique for the0CO2, CH4Concentration0Calibration of Gas0Dilutor – Gas0Chromatography0(Document No.: 07-3-0	standardmethodmeasurand isbranddocument nameminimumunits/model/no.valueunitsStandard gas:Instrument Calibration0%NMIs/CO,Technique for the	standardmethodmeasurand level or rangebranddocument nameminimumunitsmaximum/model/no.valueunitsmaximumStandard gas:Instrument Calibration0%100NMIs/CO, CO2, CH4Technique for the Calibration of Gas Dilutor – Gas0%100O%100100100O%100100100	standardmethodmeasurand level or rangebranddocument nameminimum valueunitsmaximum valueunits/model/no.valueunitsmaximum valueunitsStandard gas:Instrument Calibration Technique for the CO2, CH40%100%Concentration Calibration of Gas Dilutor – Gas (Document No.: 07-3-0%100%	standardmethodmeasurand level or range/independent variablebranddocument nameminimum valueunitsmaximum valueunitsexplanation/model/no.0%100%CO2/N2@ (50 to 500) µmol/molStandard gas:Instrument Calibration Technique for the CO2, CH40%100%CO2/N2@ (50 to 500) µmol/molCO2, CH4Concentration Calibration of Gas Dilutor – Gas (Document No.: 07-3-0%100%CO/N2@ (100(1 to 100) µmol/mol	standardmethodmeasurand level or range/independent variableuncerbranddocument nameminimum valueunitsmaximum valueunitsexplanationvalue/model/no.valueunitsmaximum valueunitsexplanationvalueStandard gas:Instrument Calibration0%100%CO2/N2@0.03NMIs/CO, CO2, CH4Concentration Calibration of Gas Dilutor – Gas Chromatography0%100%CO/N2@0.02(1 to 100) µmol/mol0%100%CH4/air @0.15(Document No.: 07-3-0%100%CH4/air @0.15

Note: Smallest uncertainty represents an expanded uncertainty using a coverage factor approximately 95 % level of confidence.

(Null Below)

