



# Round robin Intercomparison

**D4.3, 4.4, 4.7, D4.10** Round-robin intercomparison with an ensemble of 4 standards with different concentrations



## Round-Robin Experiment

- Canisters (Luxfer)
  - Aluminium cylinders
  - Stainless steel valve
  - 10 litre (120cm x 14cm (h x d))
  - Weight (15 kg)
  - Max. operating pressure 3000 psig
- Equipped with stainless steel pressure regulators (CGA580) (Parker Veriflo) and 1/16" tubing



# Round robin intercomparison

<i>Fill ID</i>	<i>Cylinder ID</i>	<i>Filling Detail</i>	<i>Pressure</i>	<i>CH4 [ppb]</i>	<i>CO2 [ppm]</i>	<i>N2O [ppb]</i>	<i>CO [ppb]</i>	<i>H2O [ppm]</i>
<b>E-097A</b>	DO451 77	Rix-Dubendorf, 130507	140 bar	2074.9	455.7	330.93	574.9	241.7
<b>E-110</b>	DO451 70 (former H-226)	Rix-Rigi†	140 bar	1944.6	403.6	327.31	161.5	240.5
<b>E-111</b>	DO451 71 (former H-227)	7.2 bar SA†, then Rix-Rigi†	140 bar	1854.4	384.9	312.06	158.6	148.9
<b>E-112</b>	DO451 80 (former H-228)	30 bar Rix-Duebendorf (20 <sup>th</sup> February 2014)* then fill at Rix-Rigi†	140 bar	1953.9	404.94	327.37	168.2	181.7



LAB NO.	Institution	PI
<b>1 (Reference laboratory)</b>	University of Bristol	Simon O' Doherty
<b>2</b>	Mace Head Research Station	Simon O' Doherty
<b>3</b>	EMPA, Lab for air pollution/environmental technology, Überlandstr. 129 CH-8600 Duebendorf, Switzerland	Stefan Reimann /Martin Vollmer
<b>4</b>	Institute for Atmospheric Sciences and Climate - National Research Council of Italy (ISAC-CNR), Via Gobetti 101, 40129 Bologna (Italy)	Michaela Maione
<b>5</b>	Institut für Atmosphäre und Umwelt, Altenhöferallee 1, 60438 Frankfurt am Main, Germany	Andreas Engel
<b>6</b>	School of Environmental Sciences, University of East Anglia, NR4 7TJ, Norwich, UK	Bill Sturges / Johannes Laube
<b>7</b>	Norwegian Institute for Air Research (NILU) Instituttveien 18, NO-2007 Kjeller, Norway	Chris Lunder
<b>8</b>	Department of Physicochemistry of Ecosystems, The Henryk Niewodniczanski Institute of Nuclear Physics Polish Academy of Sciences, 31-342 Krakow, Poland,	Jaroslaw Bielewski

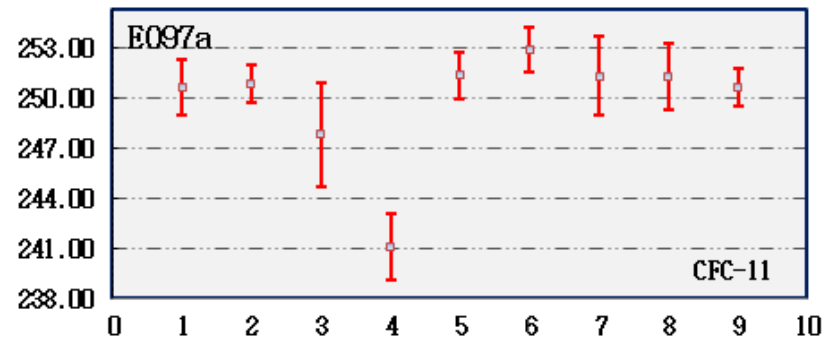
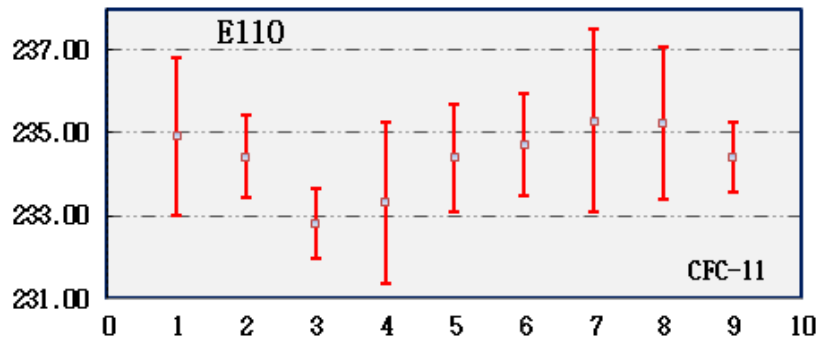
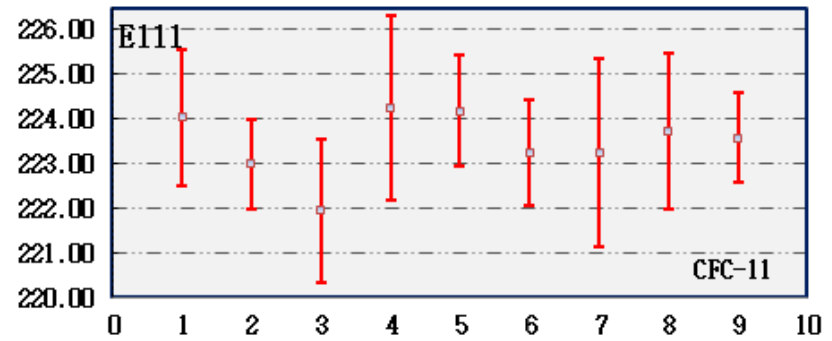
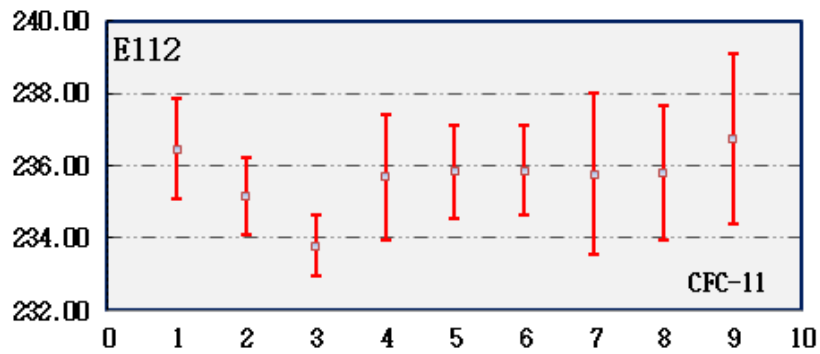


# List of Compounds

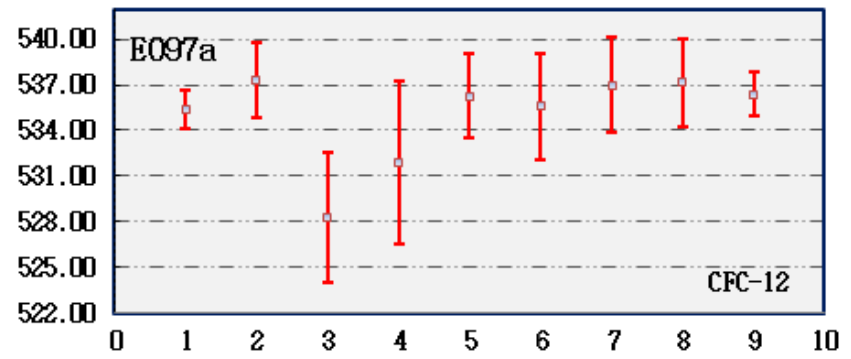
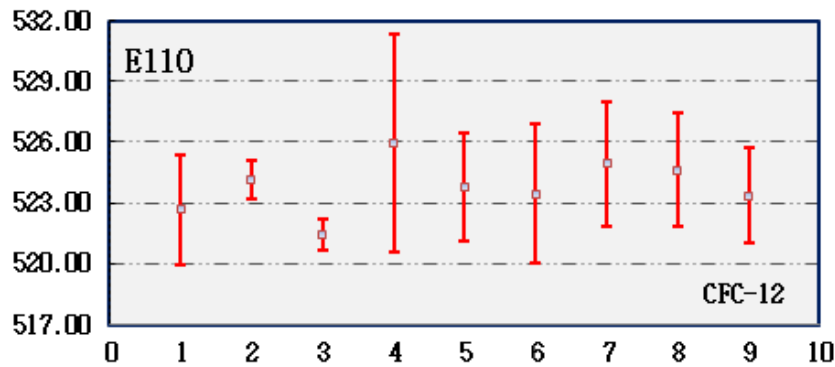
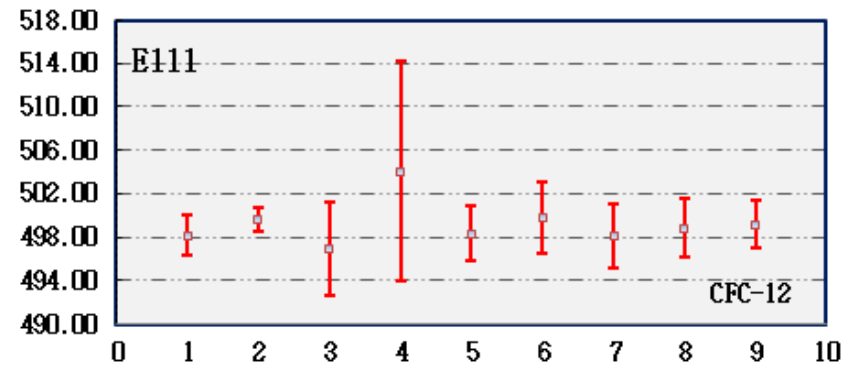
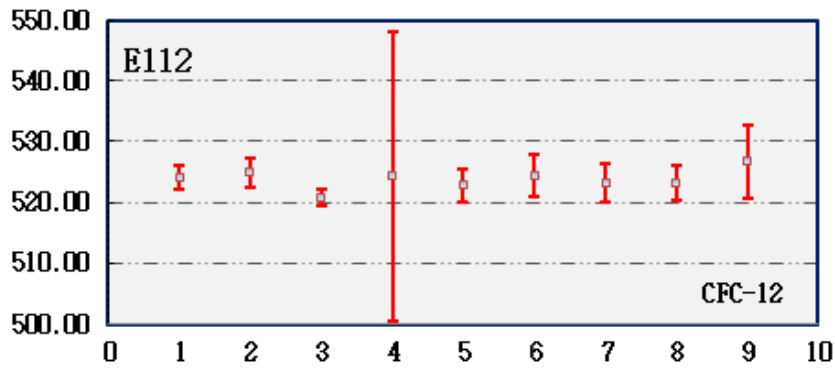
HFC's	CFC's	HCFC's	Halons	Halocarbons	
HFC-23	CFC-11	HCFC-141b	H-1301	CH <sub>3</sub> Cl	CF <sub>4</sub>
HFC-32	CFC-12	HCFC-142b	H-1211	CH <sub>3</sub> Br	SF <sub>6</sub>
HFC-134a	CFC-13	HCFC-124	H-2402	CH <sub>3</sub> I	SO <sub>2</sub> F <sub>2</sub>
HFC-125	CFC-113			CH <sub>2</sub> Cl <sub>2</sub>	
HFC-143a	CFC-114			CHCl <sub>3</sub>	
HFC-365mfc	CFC-115			CHBr <sub>3</sub>	
				CCl <sub>4</sub>	
				TCE	
				PCE	



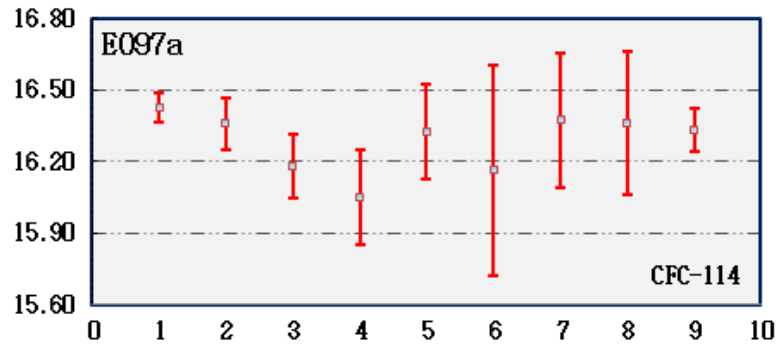
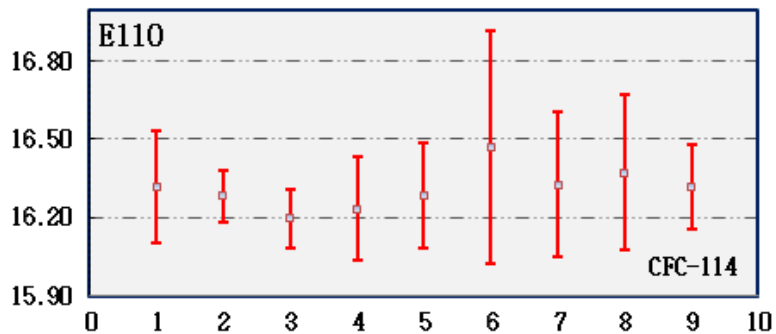
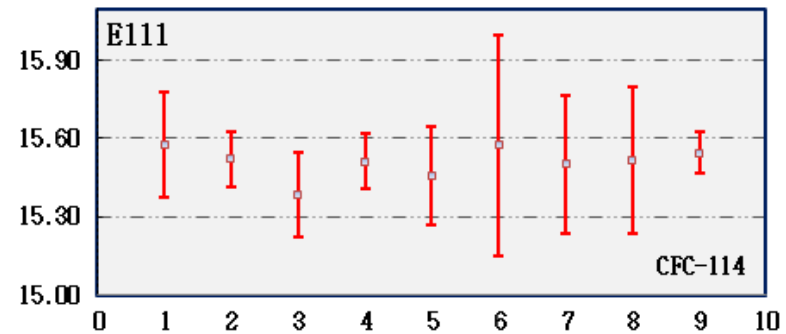
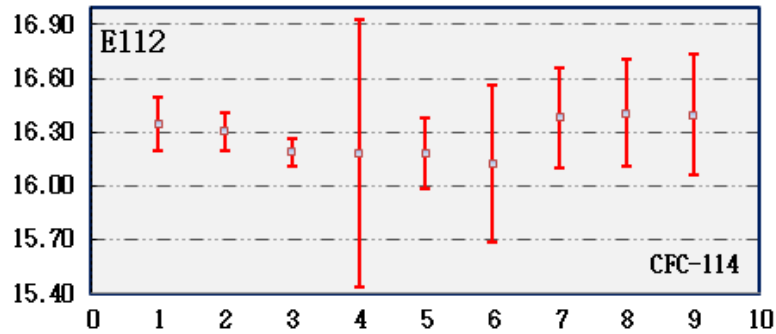
# CFC11



# CFC12

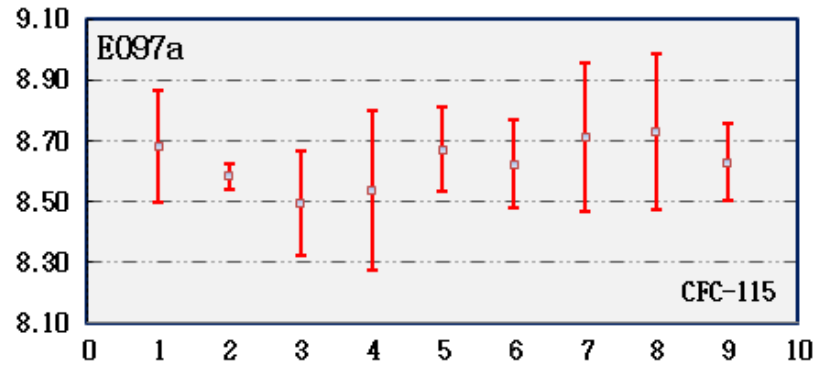
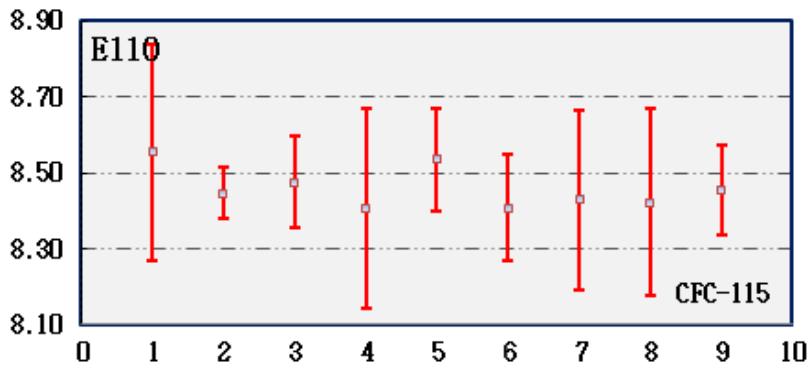
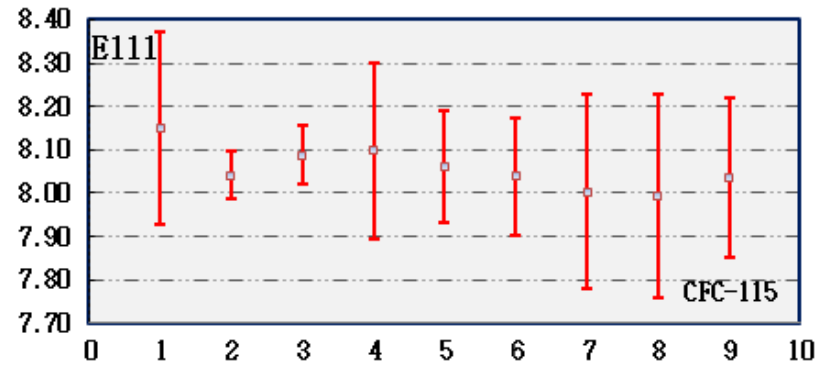
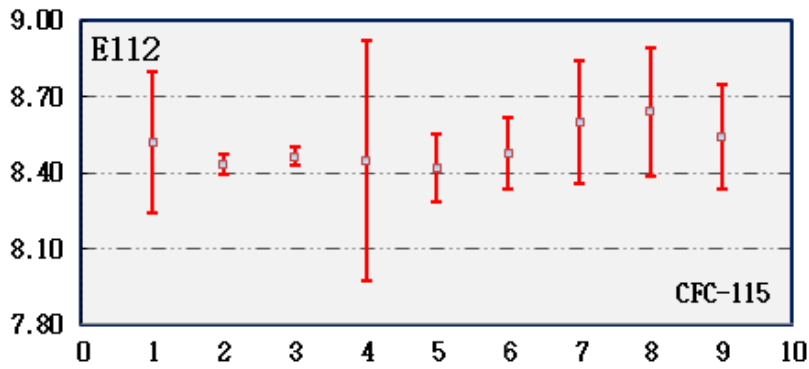


# CFC114

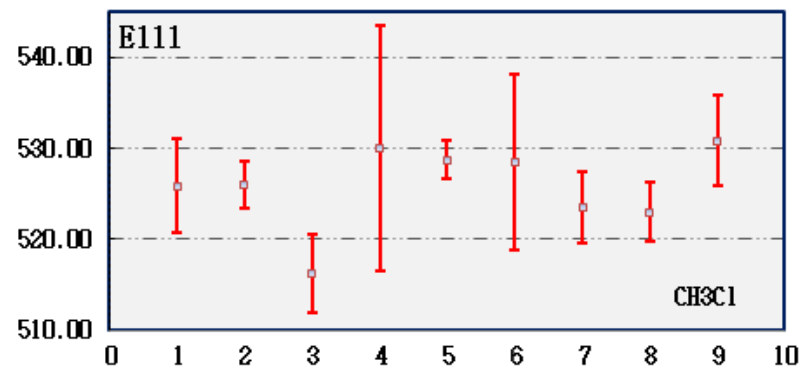
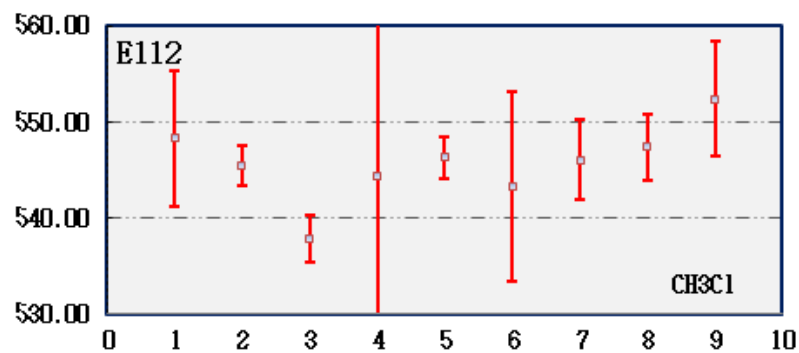
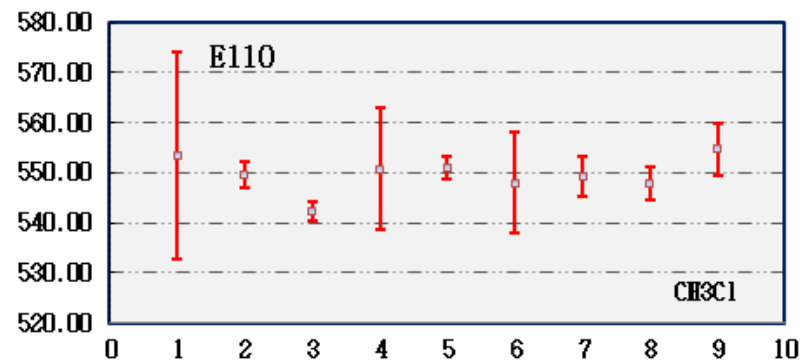
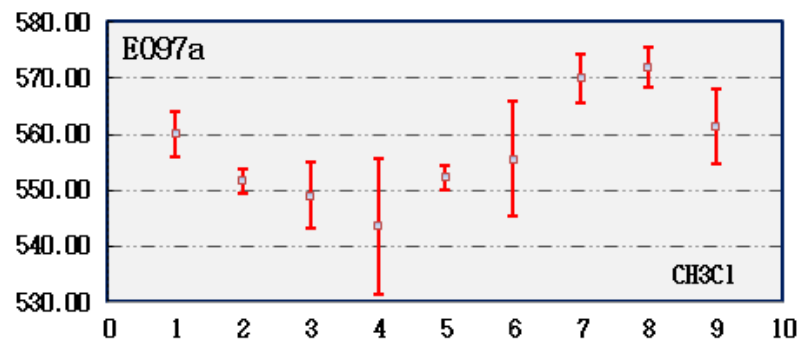




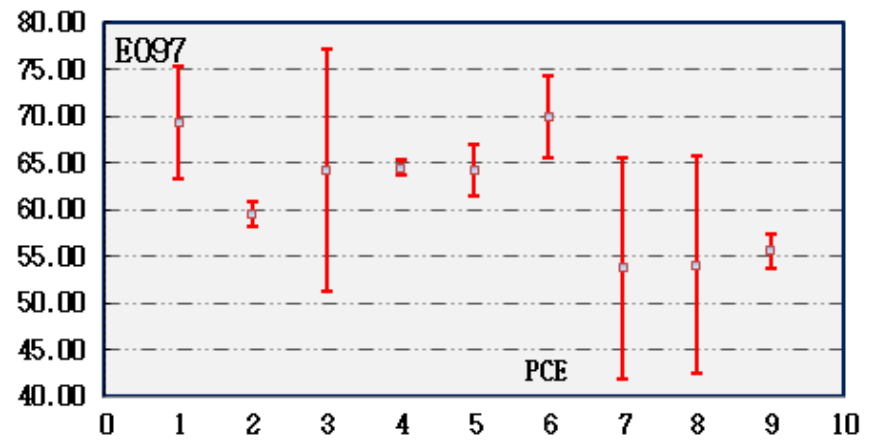
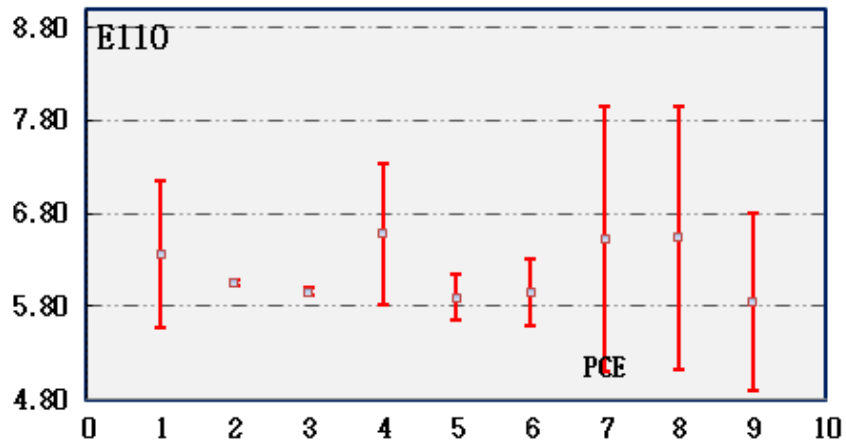
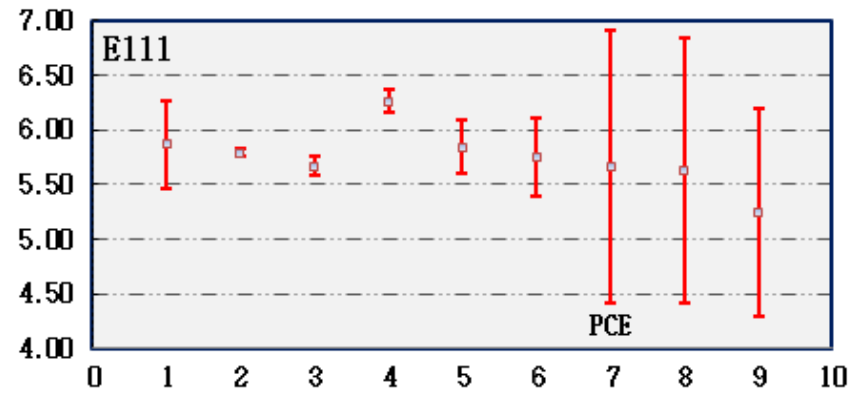
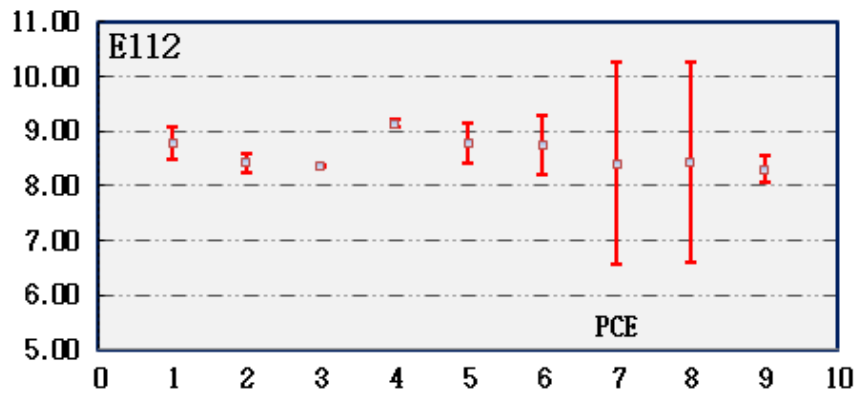
# CFC115



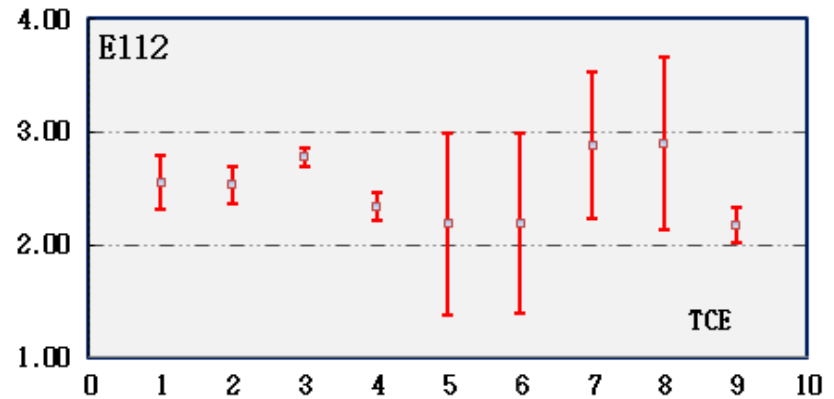
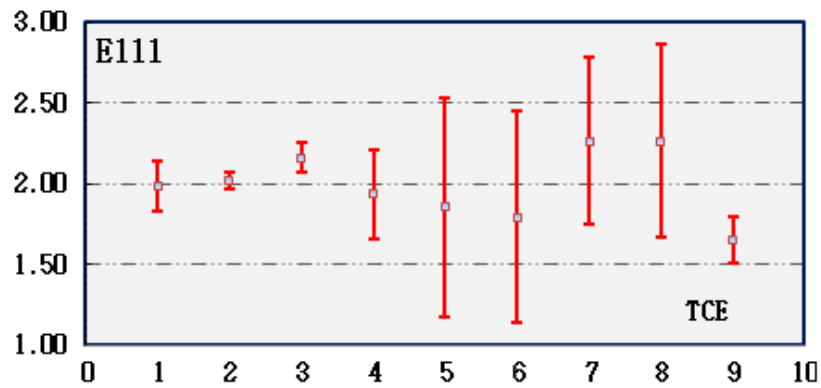
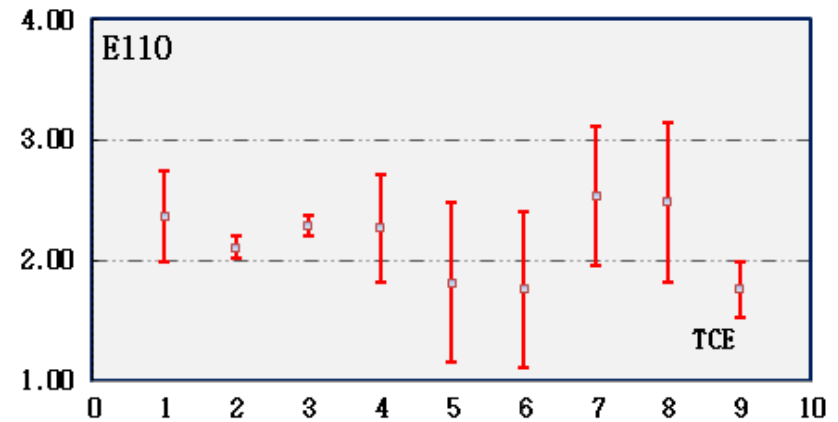
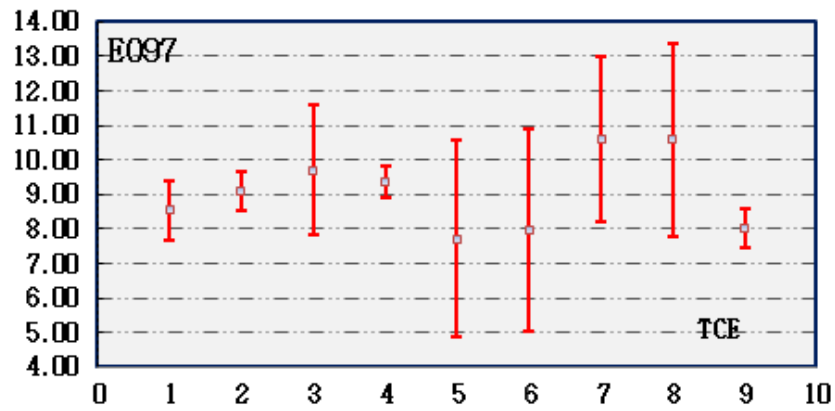
# CH<sub>3</sub>Cl



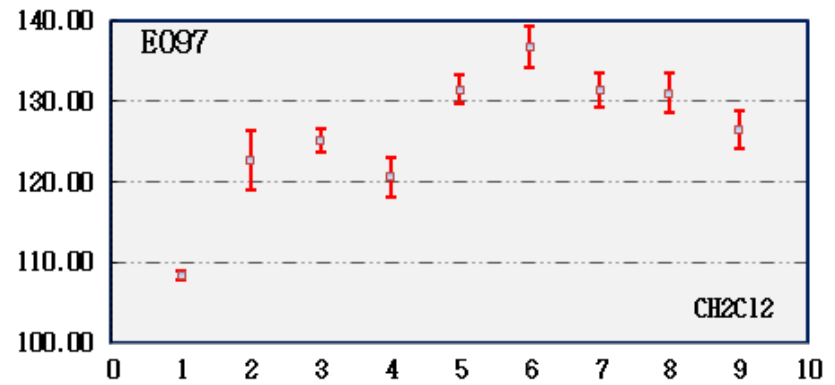
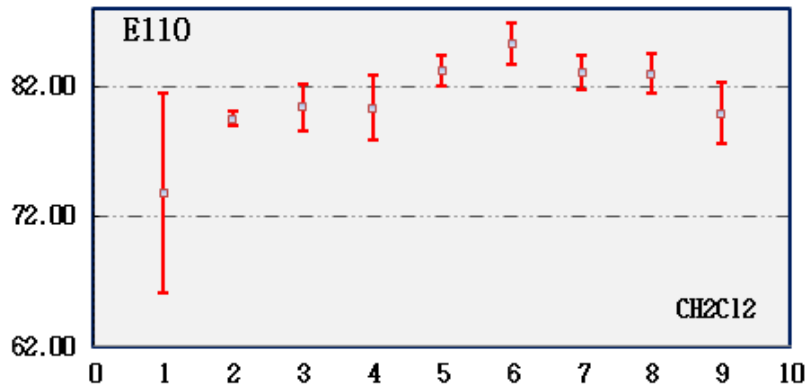
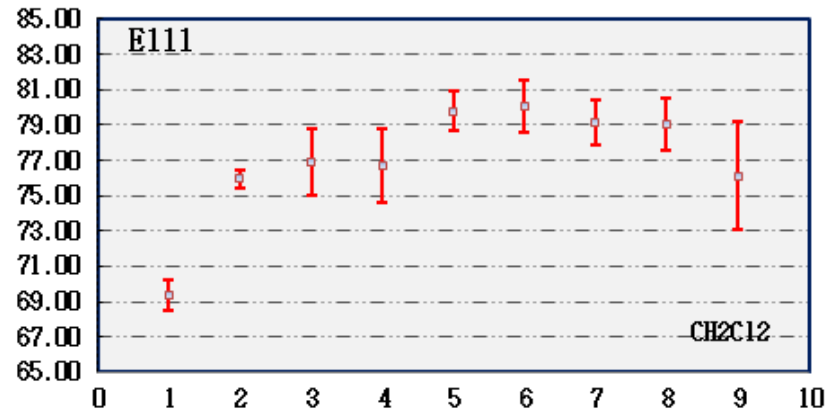
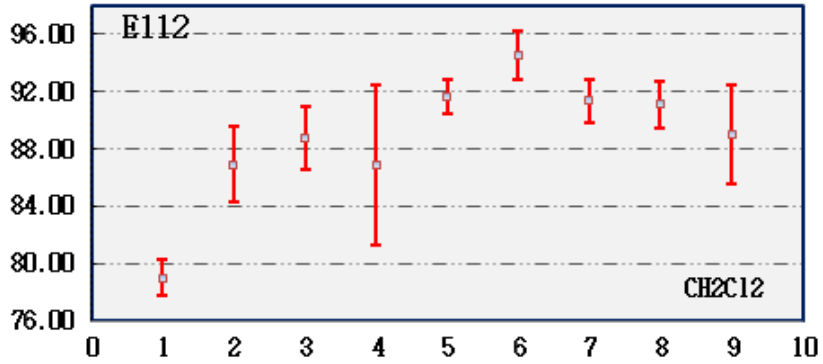
# PCE

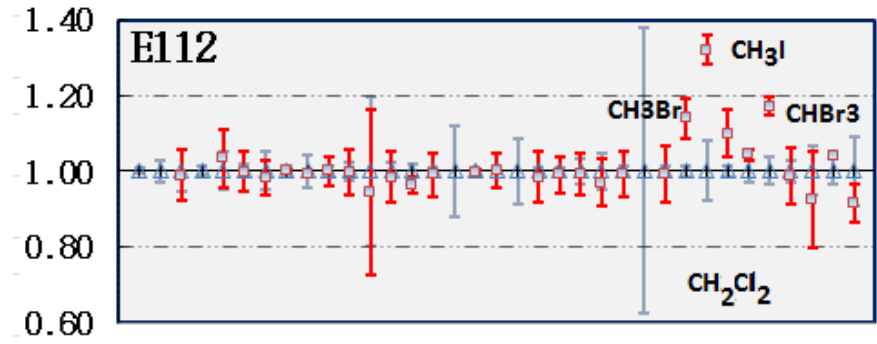
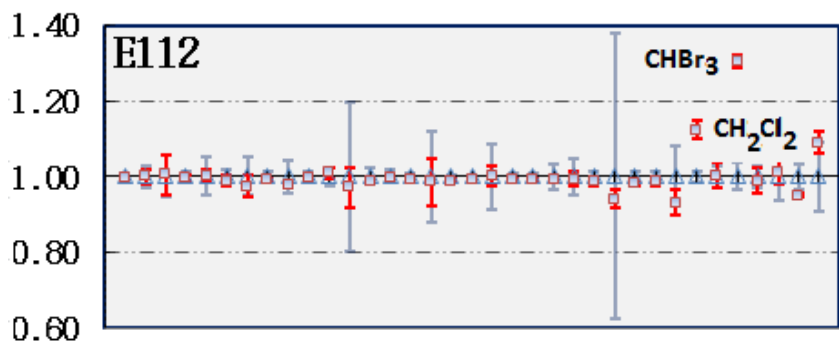
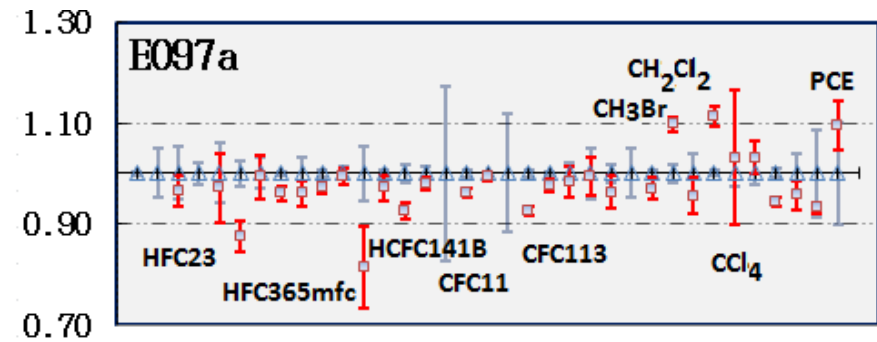
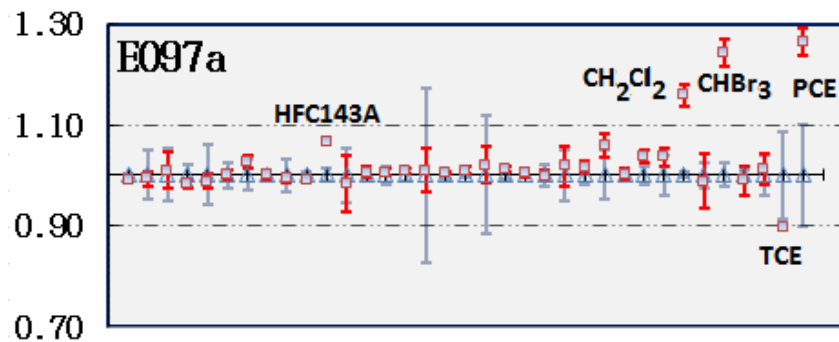


# TCE



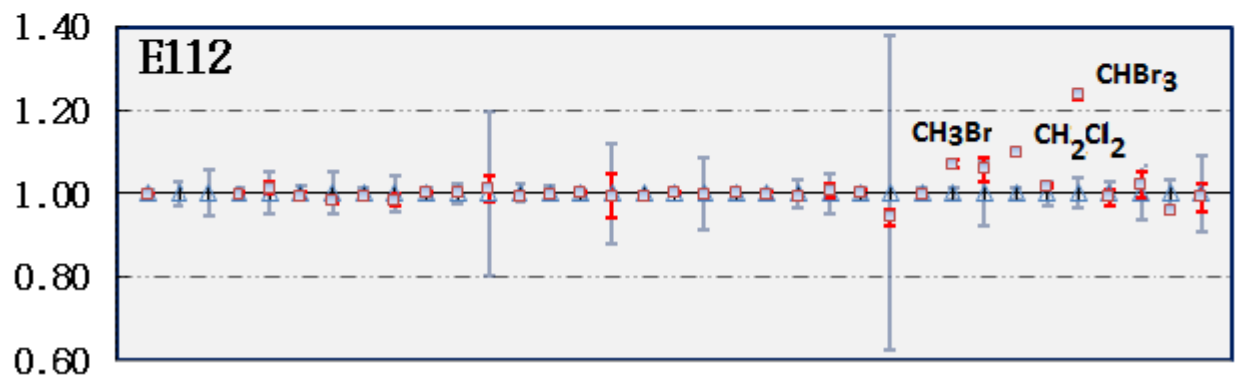
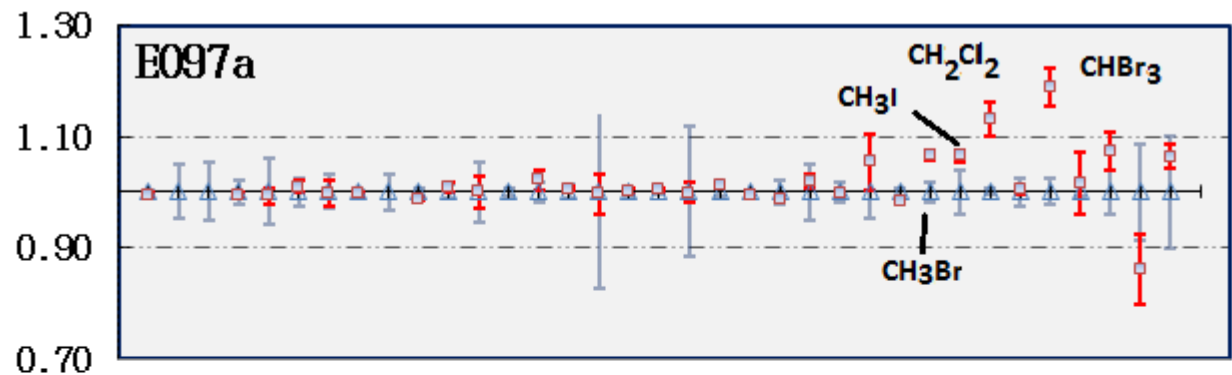
# CH<sub>2</sub>Cl<sub>2</sub>





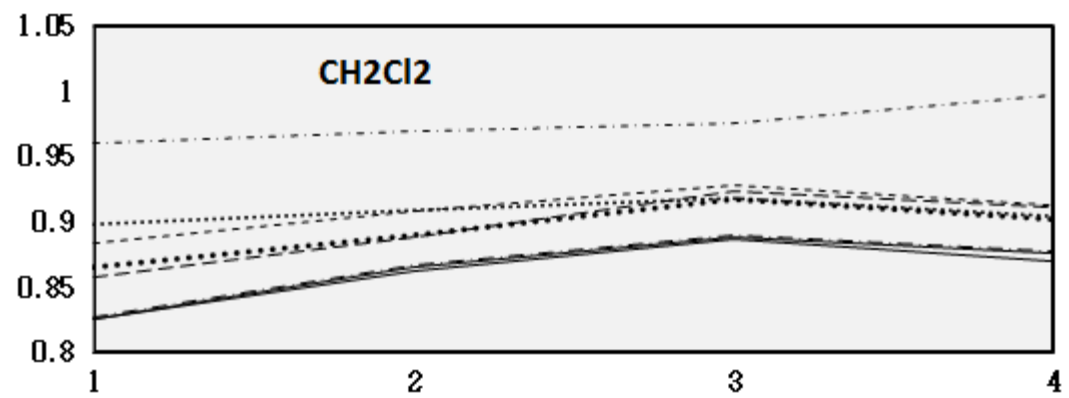
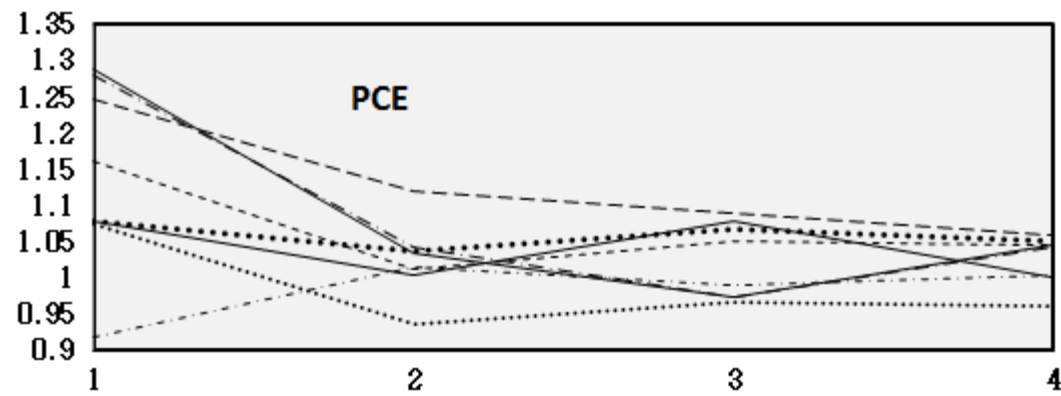
△ Normalised Mixing ratios (central laboratory)  
 □ LAB 1

△ Normalised Mixing ratios (central laboratory)  
 □ LAB 2



$\triangle$  Normalised Mixing ratios (central laboratory)  
 $\square$  LAB 3







## Summary

- Inter-comparison still ongoing
- For CFC's, Halons, HFC's and HCFC's there is agreement between the labs at 99% confidence limit
- For some halocarbons there are larger differences between the lab's and the difference is concentration dependent

