



**GAW World Calibration Centre (WCC) for Methane
and
Quality Assurance/Science Activity Centre (QA/SAC)
in Asia and the South-West Pacific**



**Methane Reference Gas Intercomparison for Asia from 2014 to 2016
Technical Details on Laboratory Measurements**

Indian Institute of Tropical Meteorology (IITM)

1. Information on contributors

- (1) Contributors: Dr. Yogesh K. Tiwari
- (2) Organization: Indian Institute of Tropical Meteorology

2. Information on instrument

- (1) Analytical method: Gas Chromatography (FID)
- (2) Manufacturer: Thermo Fisher Scientific
- (3) Model: Trace GC Ultra

3. Information on sampling

- (1) Sampling volume: 5 ml
- (2) Carrier gas: Nitrogen
- (3) Flow rate: 30 ml/min
- (4) Temperature of the oven: 70 degree centigrade

4. Information on the main column

- (1) Diameter: 1/8 inch
- (2) Length: 4 meter
- (3) Material: Stainless steel

5. Information on column packings

- (1) Trade name: Packed column HayeSep
- (2) Mesh: 4m, 1/8" HayeSep Q 80/100 mesh

6. Information on standard gas

- (1) Number of standard gases: 3
- (2) Mole fraction of standard gases: 1652.22, 1856.24, 1994.48 ppb
- (3) Diluent gas: Purified air
- (4) Scale: WMO X2004A Scale

7. Other information (references, papers, literatures, etc.)

Yogesh K. Tiwari, Ramesh K. Vellore, K. Ravi Kumar, Marcel van der Schoot, Chun-Ho Cho, 2014, Influence of monsoons on atmospheric CO₂ spatial variability and ground-based monitoring over India, Science of The Total Environment, Volume 490, 15 August 2014, Pages 570–578, ISSN: 0048-9697 <http://dx.doi.org/10.1016/j.scitotenv.2014.05.045> [IF=

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K. Ravi Kumar, Yogesh K. Tiwari*, Vinu Valsala, Raghu Murtugudde, 2014, On understanding of land-ocean CO₂ contrast over Bay of Bengal: A case study during 2009 summer monsoon, Environmental Science and Pollution Research, Volume 21, Issue 7, April 2014, Page 5066-5075, ISSN: 0944- 1344, DOI:10.1007/s11356-013-2386-2

Yogesh K. Tiwari, K. Ravi Kumar, Glass Flask Air Sample Analysis through Gas Chromatography in India: Implications for Constraining CO₂ Surface Fluxes, 15th WMO/IAEA Meeting of Experts on Carbon Dioxide, Other Greenhouse Gases and Related Tracers Measurement Techniques, WMO / GAW Report No. 194, WMO/TD-No. 1553, April 2011

Yogesh K. Tiwari, K. Ravi Kumar, 2012, GHGs observation programs in India, Asian GAW greenhouse gases news letter, Vol.3, ISSN 2093-9590, page 5-11, Korea Meteorological Administration, Seoul, South Korea, December 2012