

---

# Ciba Phosphorus Volatility Test (CPVT)

## ESCIT Meeting

December 12<sup>th</sup> , 2006

GM Powertrain

Pontiac, MI

Presented By ©Ciba Specialty Chemicals

# Assessment of P volatility

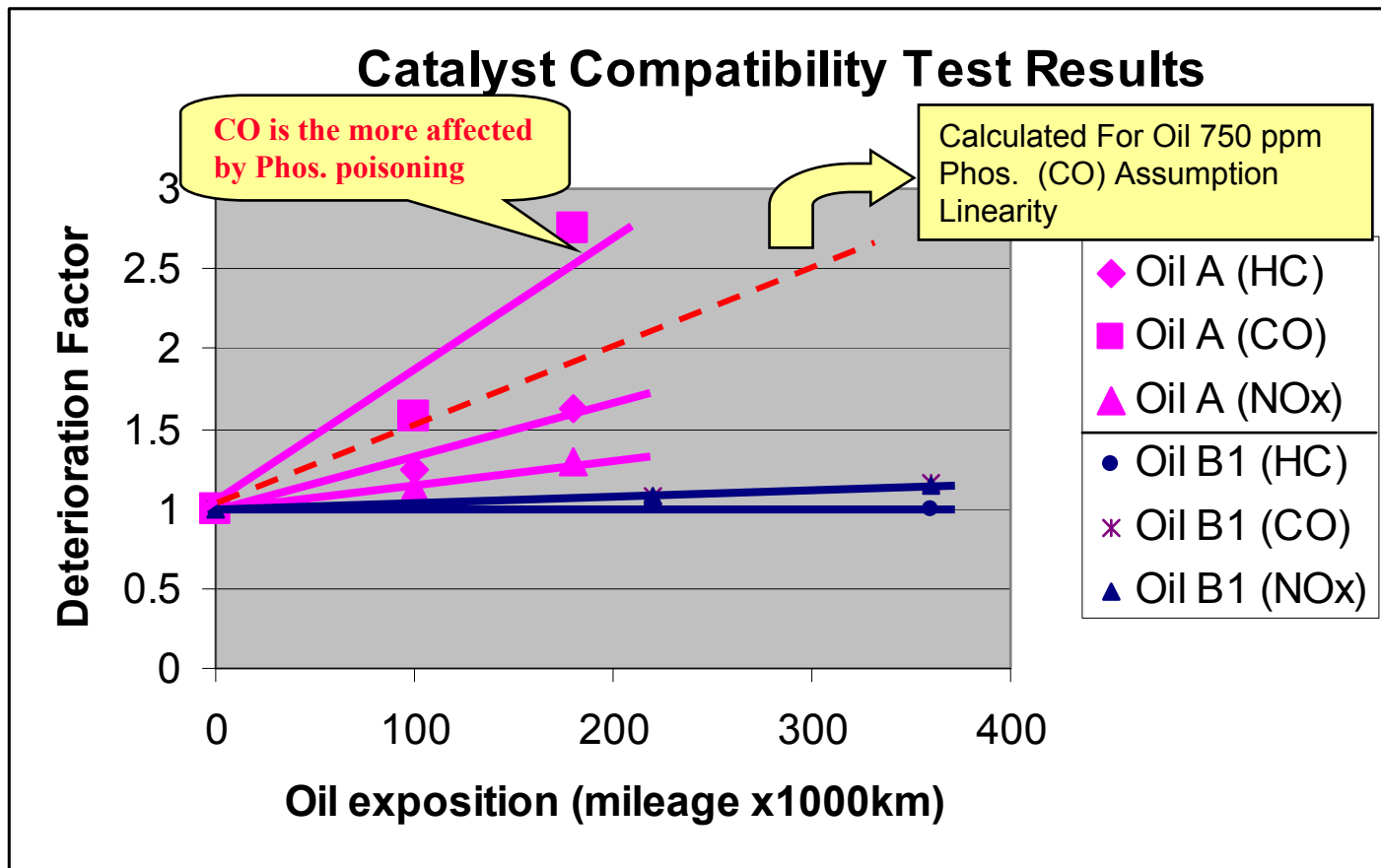
---

- In our previous publications, several methods for measuring P volatility of engine oils were reported
  - TGA of pure additive – did not give representative results
  - Modified Noack (PEI<sub>250</sub>) – P losses for some ashless compounds tended to be overstated
- Bench test conditions for measuring P volatility of engine oils should be similar to actual engine conditions, e.g.
  - Bulk oil in crankcase (~150C) for hours
  - Thin oil film on piston ring/liner (~250C) for seconds/minutes  
**(Amended with Ca measurement for the agreed calculation formula)**
- Any Bench Test will have to demonstrate:
  - Ability to identify **high Phosphorus volatility** compounds under engine conditions
  - Ability to identify **low phosphorus volatility** compounds under engine conditions

→ Obviously to correlate to Field Tests

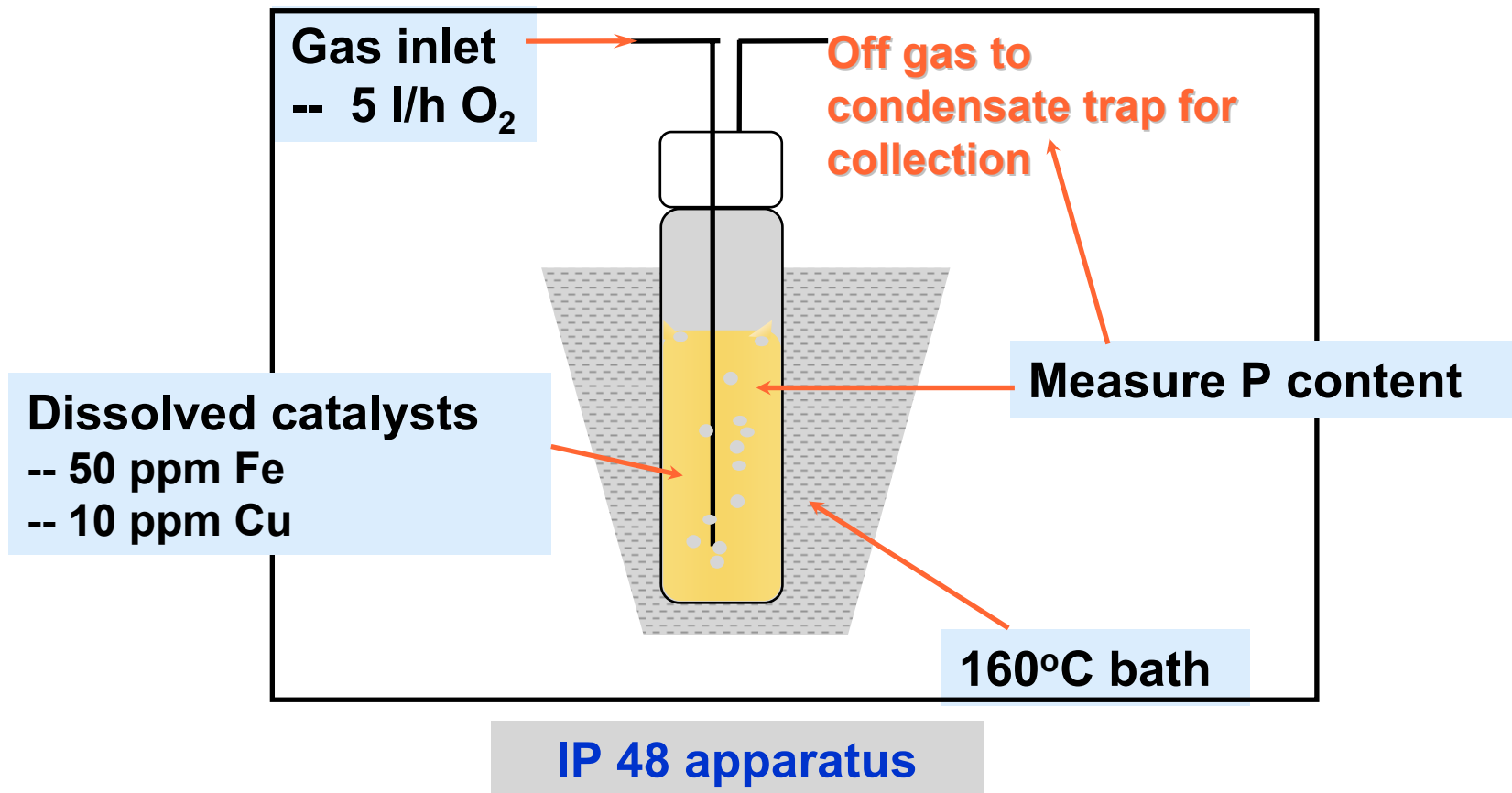
# Catalyst (TWC) compatibility Tests Results

	Oil A	Oil B1
S, ppm	4080	2000
P, ppm	1080	530
Ca, ppm	1590	2200
Mg, ppm	1000	0
Zn, ppm	1200	0



# Ciba Phosphorus Volatility Test (CPVT)

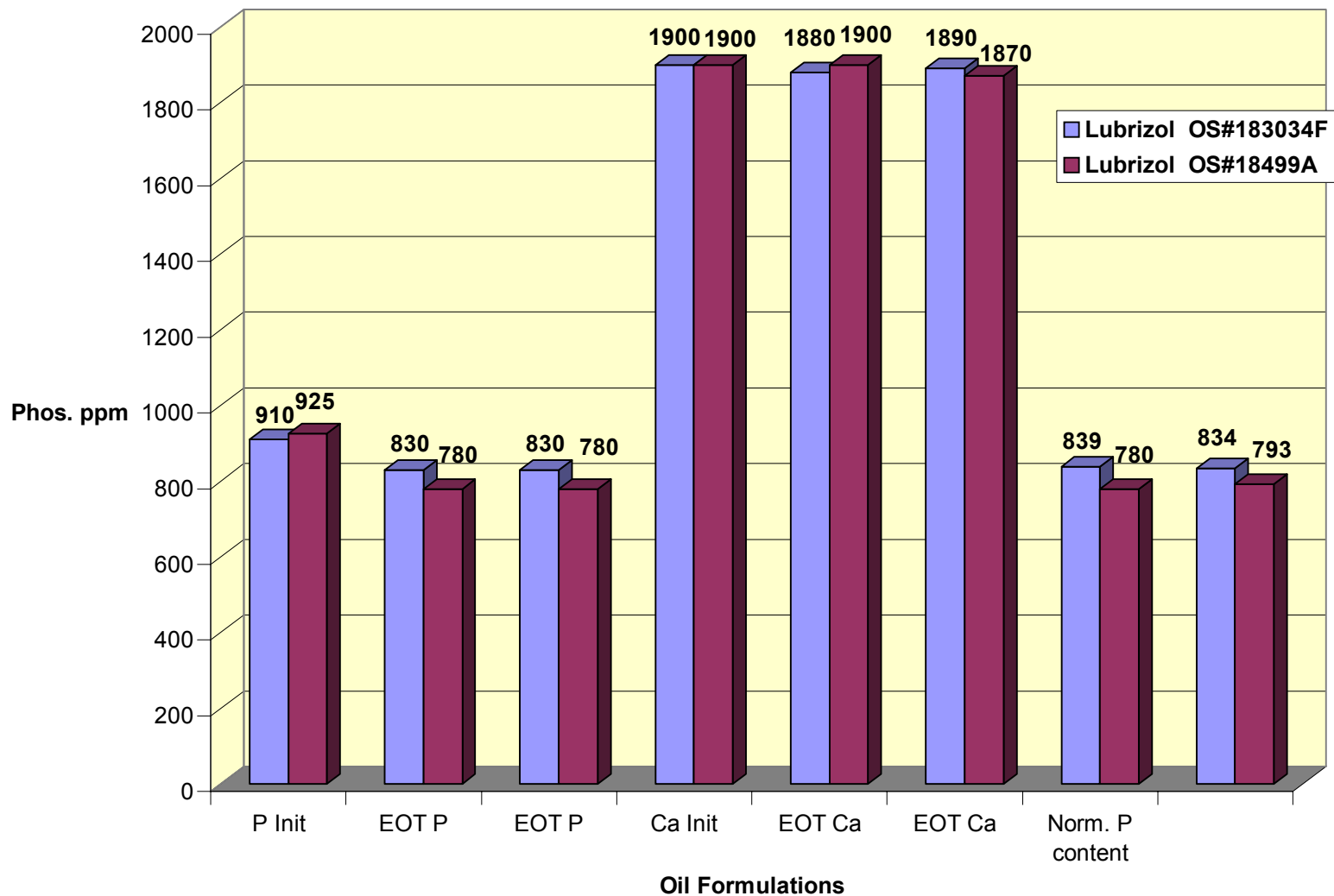
Realistic Exposure and Ageing conditions



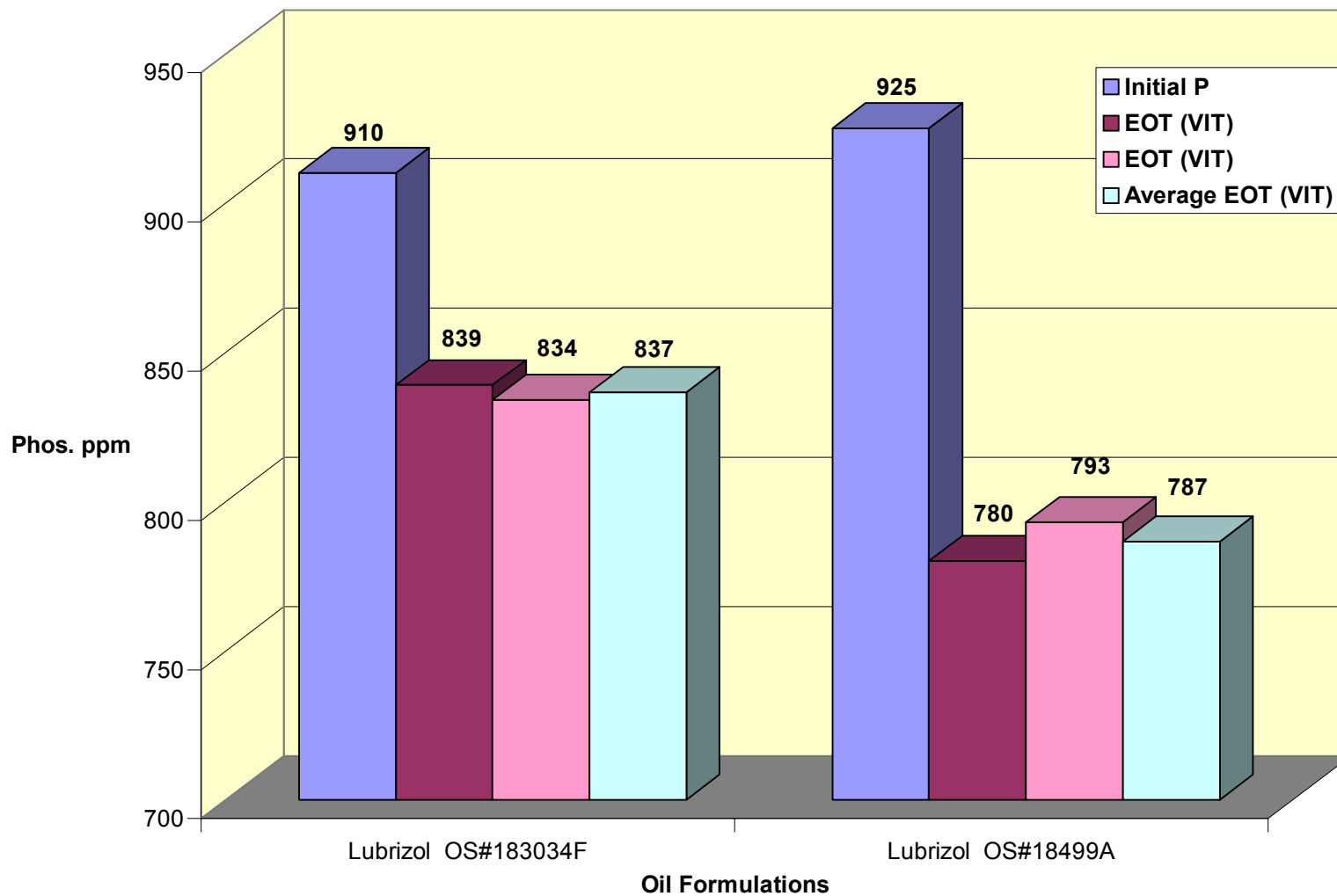
**Bulk oil aging addresses the crankcase model**



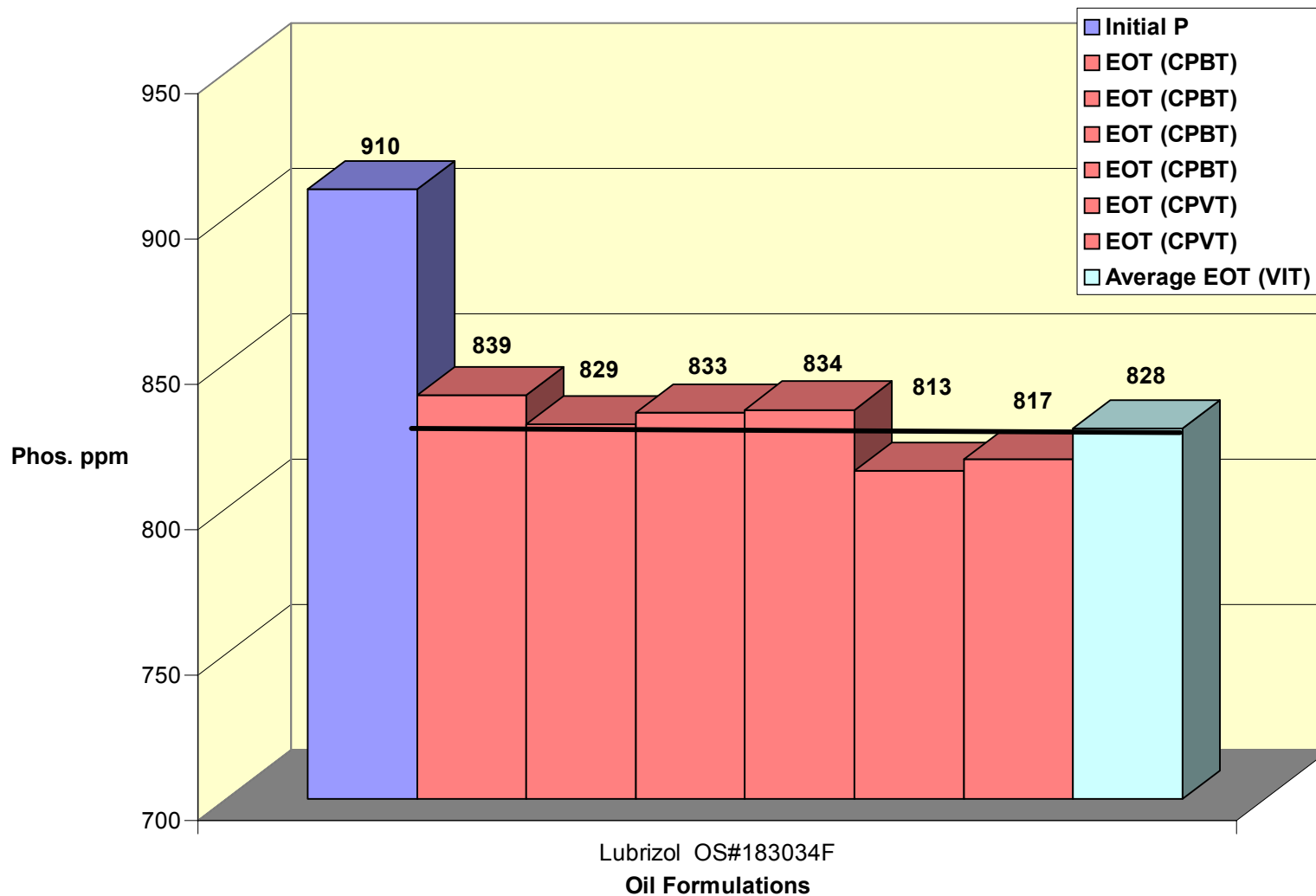
## Phosphorus Volatility in Ciba Phos. Volatilization Test (CPVT)



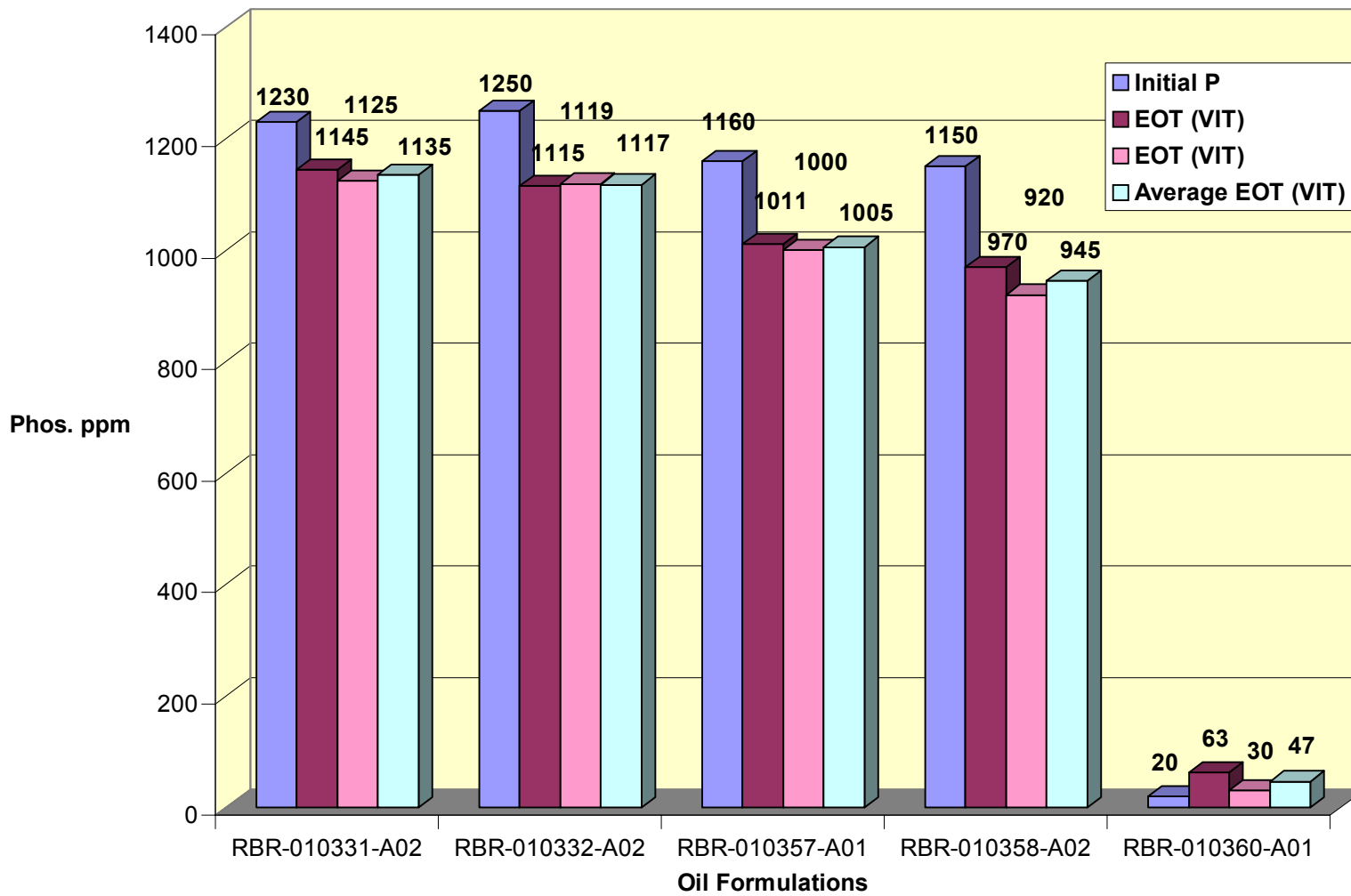
## Phosphorus Volatility in Ciba Phos. Volatilization Test (CPVT)



## Phosphorus Volatility in Ciba Phos. Volatilization Test



## Phosphorus Volatility in Ciba Phos. Volatilization Test (CPVT)





# Summary:

---

- Ciba Phosphorus Volatility Test is an easy and quite economical test.
  - CPVT ranks properly the Phos Volatility of all oils ran with field test results.
  - The repeatability and accuracy of CPVT is acceptable but more statistical data analysis required.
  - Differentiation between the Phos Volatility should probably be improved.
  - Future Work: Run several Phos. Containing additives with known high and low Phos. Volatility.
- We welcome any comments

---

# Ciba



Ciba Specialty Chemicals MAKES NO REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. No statements herein are to be construed as inducements to infringe any relevant patent. Under no circumstances shall Ciba Specialty Chemicals be liable for incidental, consequential or indirect damages for alleged negligence, breach of warranty, strict liability, tort or contract arising in connection with the product(s). Buyer's sole remedy and Ciba Specialty Chemicals' sole liability for any claims shall be Buyer's purchase price. Data and results are based on controlled or lab work and must be confirmed by Buyer by testing for its intended conditions of use. The product(s) has not been tested for, and is therefore not recommended for, uses for which prolonged contact with mucous membranes, abraded skin, or blood is intended; or for uses for which implantation within the human body is intended.

ESCIT 2006

©Ciba Specialty Chemicals *"We Create Effects to Improve the Quality of Life"*