

(Nano) Particles from 2-S Scooters: SOF/INSOF, Improvements of Aftertreatment, Toxicity

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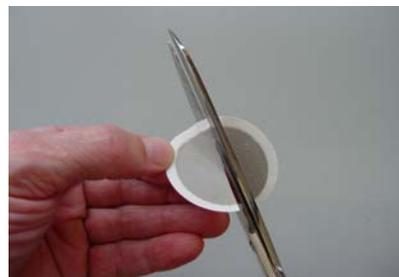
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Peugeot scooters: left TSDI, right "carburetor"



TSDI Carburetor

SOF / INSOF



The preceding solvent extraction influences very much the Coulometric results EC, OC, & TC

EC after ext. / TC before ext.
3 - 4,5% wt. for TSDI
10 - 17% wt. for Carb.

Charing
• Partial polymerisation of heavy HC's during the thermal extraction of SOF
• Increased supply of carbon for the final O₂- oxidation increase of EC

Buck WFC

BUCK - WFC

Wiremesh Filter-Catalyst - For Scooter application

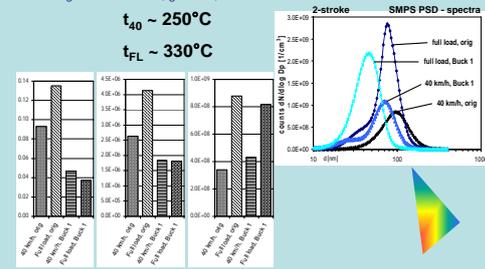


WFC For chain saw

WFC... Wiremesh Filter-Catalyst

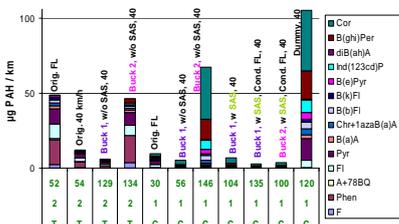
BUCK 1 = WFC + Ox.Cat.
BUCK 2 = WFC only
WFC → stainless steel, coated Pt/Rh 5:1

Particle mass and nanoparticles at 40 km/h and full load, warm, with original muffler and Buck 1 Peugeot Loxor TSDI; gasoline; lube oil Motorex N°2.



TEQ ... Toxicity Equivalence TEF ... Toxicity Equivalence Factor

Comparison between PAH emissions from 2 different technologies (TSDI and Carburetor) and different combinations of after-treatment, cycles and preconditioning of the motorbikes.



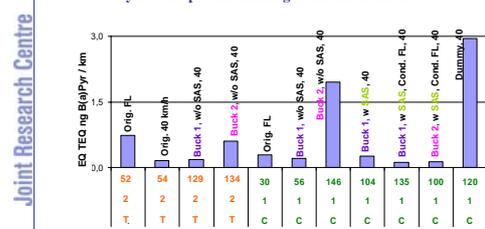
Toxicity

PAH	TEF	PAH-derivative	TEF
benzo[a]pyrene	=1		
dibenz[a,h]pyrene	10	7,12-dimethylbenzanthracene	65
dibenz[a,h]pyrene	10	1,6-dinitropyrene	10
dibenz[a,h]pyrene	10	6-methylchrysene	10
dibenz[a,h]anthracene	1.1	3-methylcholanthrene	5.7
7H-dibenz[<i>a,g</i>]perylene	1	5-methylchrysene	1
dibenz[a,e]pyrene	1	1,8-dinitropyrene	1
indeno[1,2,3-cd]pyrene	0.1	4-nitropyrene	0.1
benzo[a]anthracene	0.1	1-nitropyrene	0.1
benzo[b]fluoranthene	0.1	5-nitroacenaphthene	0.034
benzo[k]fluoranthene	0.1	2-nitrofluorene	0.01
dibenz[<i>a,j</i>]acridine	0.1		

Total TEQ = Σ TEF_i x CONC_i

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Variation of B(a)P toxicity equivalents from 2 different technologies (TSDI and Carburetor) and different combinations of after-treatment, cycles and preconditioning of the motorbikes.



- Conclusions:**
- PAH analysis confirmed that the WFC inline with oxidation catalyst traps and oxidizes the volatile and particulate compounds more efficiently than the WFC itself.
 - Total PAH results and TEQ are very much influenced by oxidative capacity of the complete aftertreatment system – WFC lowers the emission level.
 - WFC shows storage – release effects at different operating conditions dependent on the exhaust gas temperature.
 - Conditioning at full load cleans the WFC, may improve the oxidation ability, but also may damage the catalytic coating.
 - The investigated WFC lost its catalytic efficiency after some extreme thermal operating conditions (until 950°C).