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(54) **Diesel fuel additives containing cerium or manganese and detergents**

(57) Provided herein is a diesel fuel additive composition comprising cerium oxide nanoparticles, optionally a manganese compound, a detergent, and a demulsifier. In one embodiment, the demulsifier has relatively low phosphorus concentration to thereby improve the solubility of the components and the thermal stability and clarity

of the resulting diesel fuel. Also provided are methods for improving fuel economy, reducing smoke production, inhibiting deposition of sludge, and improving storage stability.

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European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 25 1694

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2004/065529 A (OXONICA LTD [GB]; SCATTERGOOD ROGER [GB]) 5 August 2004 (2004-08-05) * claims 1,7,17,19-22; examples *	1-31, 33-35	INV. C10L1/10 C10L1/12 C10L10/18
X	US 2005/060929 A1 (CAPROTTI RINALDO [GB] ET AL) 24 March 2005 (2005-03-24) * examples *	13-23	
X	WO 2005/012465 A (OXONICA LTD [GB]; ANDERSON STUART JAMES [GB]; SCATTERGOOD ROGER [GB]) 10 February 2005 (2005-02-10) * page 5 - page 6; claims 17,21,22 *	13-23	
A	C. MABILLE: "Fuel additives"[Online] XP002464974 Retrieved from the Internet: URL: http://www.vanraak.be/uploaddata/upload/0/doc00200.pdf [retrieved on 1999-10-30] * page 5 *	1-35	
X	WO 03/040270 A (OXONICA LTD [GB]; WAKEFIELD GARETH [GB]) 15 May 2003 (2003-05-15) * page 9, line 3 - page 10, line 28; claims 1,9,13,16,18 *	1-31, 33-35	TECHNICAL FIELDS SEARCHED (IPC) C10L
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A	EP 1 010 748 A (CK WITCO CORP [US]) 21 June 2000 (2000-06-21) * claim 1 *	32	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 April 2008	Examiner Bertrand, Samuel
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:
- ☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-23 (all in part), 24, 27-30, 31 (in part), 35 (in part).

Method of improving diesel fuel stability (improving the solubility of an organometallic package, reducing haze, reducing filter blockage and improving demulsification)
Fuel additive

2. claims: 1-23 (all in part), 25, 26, 31 (in part), 33, 34, 35 (in part)

Method of improving combustion in a diesel engine (reducing smoke, improving an emission control system).
Emission control system.
Fuel additive

3. claim: 32

Method for reducing foam in a diesel fuel.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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18-04-2008

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

