

Petrochemicals

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Novel Stabilizer for Distillate Fuels

DESCRIPTION

- It is an effective diesel fuel stabilizer with synergistic combination of patented chemistry backed by Indian Oil R&D technology
- Established as a high performance stabilizer for improving the stability of the fuel
- Excellent performance in: ASTM D-2274, ASTM D-4625, UOP-413, Du Pont F-21-61

Advantages

- The antioxidant property of Servo-DS provides maximum sludge and sediment control and good color stability
- In-plant optimization of SERVO-DS improves shelf life of fuel both during storage and in use
- Optimal use of SERVO-DS minimizes the treat cost
- Good high temperature stability
- Completely soluble in distillate fuels
- Free flowing liquid: easy to handle

Target Countries

- All countries

Applications

- For better HSD stability
- May be directly applied into the run down line from the production unit by means of a proportioning pump
- Can be added to storage tanks, tank cars and pipelines or blending tanks. Injected directly into the gasoline streams. The dosage rate depends on desired level of oxidation stability and composition of the fuel

- **Current stage of development**
Commercialised
- **Collaboration options**
Marketing agreement, Technology transfer
- **IPR details**
Patents: Granted
Trademark: "Servo-DS"

SPECIFICATIONS

Physical State	Liquid
Appearance	Colourless to Straw Yellow
Sp. Gr@ 15.6°C	0.87 - 0.89
Flash Point	45° C (Abel)
Viscosity @ 40°C	1.5 - 2.2 CST
Packaging	190 Kg MS drums

Organisation

Indian Oil Technologies Ltd.

Cross Reference

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DESCRIPTION

- Technology for producing high yield of LPG (40-65 wt% of fresh feed), propylene (17-25 wt% of fresh feed) and butylenes (20-28 wt% of fresh feed) from heavy petroleum fractions including residue
- Feed CCR ranging from 0.35 to 5 wt%; Type VGO, RCO and SR
- Typical IRR is 17% without olefin recovery and 35% with olefin recovery

Advantages

- Yields higher LPG and light olefin due to excellent dry gas and coke selectivity of the proprietary catalyst
- Improved coke selectivity permits a very high cat/oil ratio (15-25), as compared to other processes
- Employs higher riser temperature (560 °C), and a relatively high dilution steam rate (15-20 wt% of feed) to get high catalytic conversion
- The hydrocarbon partial pressure is minimized by the high steam rate in the riser. It reduces the rate of coke formation, increases the olefinicity of products by minimizing hydrogen transfer reactions, increases the heat demand in the riser and produces a lower delta coke on catalyst
- Significantly higher catalyst to oil ratio provides very efficient heat transfer from the regenerator to the riser
- The lower delta coke results in a significantly lower regenerator temperature, which provides additional flexibility for resid processing in the new process. In fact, the heat circulation in the INDMAX reactor/ regenerator is so efficient that the unit can process up to 4-5 wt% CCR feed stock in a single stage total combustion regenerator without catalyst cooler

Target Countries

- All countries

Applications

- Refineries with high demand of LPG and propylene/ butylenes and low demand of diesel
- Refineries integrated or planning to integrate with downstream petrochemicals for exploiting the higher yield of Propylene/Butylenes
- Refineries where residues, preferably with high hydrogen content and low CCR/metals and/ or especially having hydrocracker bottom are available

Current stage of development

Commercialised

Collaboration options

Marketing agreement, Technology transfer

IPR details

Patents: Granted

Trademark: "INDMAX"

SPECIFICATIONS

Process Parameters	Conventional FCC Unit	INDMAX
<i>Feed properties</i>		
Density, gm/cc	0.89	0.89
RCR wt%	0.30	0.30
<i>Product yield wt% (fresh feed)</i>		
Dry Gas	2.9	2.9
LPG	12.1	12.1
Gasoline	31.2	31.2
Diesel	40.0	40.0
Bottom	8.3	8.3
Coke	5.5	5.5
<i>Light Olefin yield wt% (fresh feed)</i>		
Propylene	3.6	3.6
Iso-Butylene	1.2	1.2
Total Butylene	-	-
<i>Typical operating conditions</i>		
Reactor top temp, °C	490-510	490-510
Regen temp, °C	650-730	650-730
Cat/oil ratio	4-7	4-7
Reactor pressure kg/cm ² , abs	3.0-3.5	3.0-3.5

Organisation

Indian Oil Technologies Ltd.

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Technology for Disposal of Oily Sludge Bioremediation

DESCRIPTION

- Oilivorous-S is a blend of 5 specific microbes selected to biodegrade a wide range of hydrocarbon contaminants of oily sludges (notified as hazardous waste)
- The large-scale production of microbes is done under stringent conditions of quality check and final blend of microbes is adsorbed on naturally occurring biodegradable carrier matrix to facilitate its dispersion during use

Advantages

- No environmental side effects
- Consists of a natural bacterial isolates only (not genetically modified)
- Safe to handle, no disease causing organisms
- Has excellent capability to degrade wide range of hydrocarbon contaminants including organosulfur compounds

Target Countries

- All countries

Applications

- Oil refineries during crude oil storage
- Marketing installations in product storage tanks
- Pipeline installations
- Oil exploration sites

- **Current stage of development**
Commercialised
- **Collaboration options**
Technology transfer
- **IPR details**
Trademark: "OiliVorous - S"

SPECIFICATIONS

Blend of 5 microbes
Natural bacterial isolates
No disease causing organism
No environmental side-effects

Organisation

Indian Oil Technologies Ltd.

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FCC Catalyst Additive for Boosting LPG Yield

DESCRIPTION

- ZSM-5 zeolite is the active component of LPG boosting additive formulations
- This catalyst additive also promotes an increase in gasoline octane number with decrease in the bottom yield

Advantages

- Boosts LPG yield in FCC/RFCC units by 2.5-3.6 wt% at a concentration of only 5 wt% on catalyst
- Increase in gasoline yield
- Decreases Bottom yield by 0.7-1.5 wt%
- Increases Octane number of gasoline
- Good attrition strength of the additive due to better binding techniques
- Incorporation of matrix for upgradation of bottoms

Target Countries

- All countries

Applications

- Any refinery with existing FCCU/ RFCCU with high LPG demand
- Refineries integrated or planning to integrate FCCU with downstream petrochemicals for exploiting the higher yield of propylene/butylenes

- **Current stage of development**
In industrial use
- **Collaboration options**
Marketing agreement, Technology transfer
- **IPR details**
Trademark: "iMAX"

SPECIFICATIONS

Lab performance at constant conversion

Dry gas:	No change
LPG yield:	Increases
Propylene yield:	Increases
Coke:	Decreases
At constant coke, CLO yield:	Decreases
Propylene selectivity:	27-35 wt% of LPG
C4 Olefins selectivity:	31-36 wt% of LPG

Organisation

Indian Oil Technologies Ltd.

Cross Reference

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DESCRIPTION

- Continuous film contractor (CFC) is a novel mass transfer device for effective removal or conversion of undesirable sulphur components, Naphthenic acids, Acid gases from LPG and light and middle distillates, natural gas and fuel gas at lower costs
- CFC is heart of INDE Treat and INDE Sweet technologies

Advantages

- Low energy consumption due to mixing at low-pressure drop
- Effective contacting and Less settling time
- Efficient separation of hydrocarbon and aqueous streams (no caustic carryover)
- Higher hydrocarbon to caustic ratio so smaller caustic circulation is required
- Can be easily retrofitted in existing mixer-settler units
- Low Cost
- Techno-economic feasibility support provided

Target Countries

- All countries

Applications

- Refineries for removal of:
 1. H₂S from LPG, naptha & gasoline
 2. Mercaptans from LPG, naptha & gasoline
 3. Napthenic acids from diesel
 4. Acid gases from natural gas, fuel gas

- **Current stage of development**
Commercialised
- **Collaboration options**
Technology transfer
- **IPR details**
Patents: Granted
Trademark: "INDE Treat and INDE Sweet"

SPECIFICATIONS

Based on Caustic/Amine
No aqueous phase treatment
Non-dispersive contacting
Enormous surface area
High mass transfer efficiency
Small size

Organisation

Indian Oil Technologies Ltd.

Cross Reference

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DESCRIPTION

- Restore lubricity in ultra low sulfur diesel
- Lowering of Sulphur by hydro-processing leads to deterioration of lubricity which can cause failure in injection pumps. INNOVA-LI restores lubricity

Advantages

- Excellent lubricity performance (HFRR)
- Good "No Harm" performance
- Biodegradable source
- Good storage stability

Target Countries

- All countries

Applications

- Automobile fuel provider.
- Fuel consumers

- **Current stage of development**
In industrial use
- **Collaboration options**
Marketing agreement, Technology transfer
- **IPR details**
Patents: None
Trademark: "INNOVA-LI"

SPECIFICATIONS

Lab performance at constant conversion

Appearance	Liquid
Odour	Faint Odor
Acid Value	180-195
Boiling Point	> 200°C
Density	0.90-0.92 at 20
Color	Amber colored

Organisation

Indian Oil Technologies Ltd.

Cross Reference

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Needle Coke Production

DESCRIPTION

- Production of needle coke in any existing delayed coker unit using available feed streams without any costly pre-treatment. Typical Yield of needle coke is 16-25% of fresh feed
- Formation of needle coke requires specific feedstock, special coking and also special calcinations conditions

Advantages

- Low energy consumption due to mixing at low-pressure drop
- Uses the low value heavier petroleum streams without any pre-treatment
- No revamp or augmentation of the existing delayed coker unit necessary
- Virtually there is no additional cost for producing needle coke and the ex-refinery profitability will improve due to its higher price

Target Countries

- All countries

Applications

- Manufacturers of graphite electrodes for the arc furnaces in the metallurgy industry
- Existing delayed coker unit using available feed streams

- **Current stage of development**
Commercialised
- **Collaboration options**
Technology transfer
- **IPR details**
Patents: None

SPECIFICATIONS

Typical ranges of operating conditions

Coil outlet temperature:	470-510 C
Recycle ratio:	0.2-0.8
Cycle time:	18-36 hours
Coke drum pressure:	1.5-9.5 kg/cm ²

Organisation

Indian Oil Technologies Ltd.

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Refinery Models

Visbreaker Refinery Model for process Optimization (VIS-MOD)

Description

- A rigorous model based on five lumps kinetics validated extensively with industrial plant data

CRU Refinery Model for Process Optimization (REF-MOD)

Description

- Rigorous and simplified reformer models are available for SR and CCR type reformer units
- Catalyst activity and life prediction for specific cycle

Refinery Model for Hydrocracker (HC-MOD)

Description

- Rigorous hydro cracking kinetic model based on continuum theory of lumping approach and Configured for once through and recycle HCU
- Estimation effect of all critical feed properties, changing operating conditions, etc. on yield patterns and reactors CAT all in user friendly GUI
- Preliminary deactivation module and with Preliminary profitability calculations

Refinery Model for FCC & RFCC (FCC-MOD)

Description

- A rigorous model, consisting of models for all sections of FCC process, based on four lumps cracking reaction kinetics and first principles
- Model validated extensively with industrial plant data and capable of predicting the plant performance for wider range of feed quality and operating regimes

Refinery Model for Diesel-Hydrodesulphurisation (DHDS-MOD)

Description

- In-house developed correlation based pressure drop reduction for reactor beds matches with commercial plant

(Contd....)

Refinery Models

Advantages

- Optimisation of commercial plant performance for new catalyst/ additive evaluation
- Day to day monitoring of FCC unit
- Minor hardware revamp study

Target Countries

- Middle East
- South Asia
- China
- Other developing countries

Applications

- Throughput maximization in FCC unit
- New catalysts selection
- Hardware revamp study

- **Current stage of development**
In industrial use
- **Collaboration options**
Licensing
- **IPR details**
Not applicable

Organisation

Indian Oil Technologies Ltd.

Cross Reference

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Hydraulic Transmission Oils

DESCRIPTION

- Designed to meet the requirements for a fluid to protect heavy duty, highly loaded transmission systems in off-highway applications
- Special additives impart low pour point and assist in controlling the sludge and varnish at low operating temperatures

Advantages

- Excellent oxidation and thermal stability
- Friction retention properties with anti-wear performance
- Low pour point

Target Countries

- All countries

Applications

- Commercial power shift transmissions
- Use in Industrial torque converters and automatic transmissions generally fitted in earthmoving machinery

- **Current stage of development**
In industrial use
- **Collaboration options**
Marketing agreement
- **IPR details**
NA

SPECIFICATIONS

Grade Name	10W	30W
K.V.,cST @ 100 C	6.1	11.1
VI	110	104
Flash point, COC, C	222	228
Pour point, C	-33	-21

Organisation

Bharat Petroleum Corporation Ltd.

Cross Reference

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Heavy Duty Diesel Engine Lubricating Oil

DESCRIPTION

- Meets APICD/SF, MIL-L-2104C, E-DL 3/E-PL 2 of IS 13656-1993 and MACK T-7 engine test requirements

Advantages

- Extended TBN quality reserves
- Prevents oil thickening and enhances oil life
- Possess absolute control of corrosive wear
- Excellent thermal and oxidation stability
- Prolonged engine life and enhanced drain period
- Outstanding engine cleanliness

Target Countries

- All countries

Applications

- Heavy commercial vehicles
- Light commercial vehicles
- Tractors
- Diesel passenger Cars
- Jeeps

Current stage of development

In industrial use

Collaboration options

Marketing agreement

IPR details

Patents: None

Trademark: "HYLUBEMILCY"

SPECIFICATIONS

	30	40	50
Kinematic Viscosity, cST@100°C	10.3-11.5	13.5-15.2	17.5-19.2
Viscosity index, Min	95	90	90
Flash point, (COC), C, Min	215	215	220
Pour point, C, Max.	-6	-6	-6
Sulphated ash, %wt, Max	1.6	1.6	1.6
TBN, mg KOH/g, Min	9.84	9.84	9.84

Organisation

Hindustan Petroleum Corporation Ltd.

Cross Reference

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Hydraulic and Circulating Oils

DESCRIPTION

- ENKLO HLP grades meet requirement of DIN 51524 Part 2 specification Denison HF-O and HF-2 Cincinnati Milacron P-68, P-69, P-70 and IS: 11656-1986 specifications and US steel 127 also passes Vickers Vane Pump test

Advantages

- Outstanding anti-wear properties
- Excellent oxidation stability
- High FZG rating
- Better hydrolytic stability
- Excellent resistance to thermal degradation

Target Countries

- All countries

Organisation

Hindustan Petroleum Corporation Ltd.

Cross Reference

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Applications

- Sophisticated hydraulic devices with hydro-mechanical actuators
- Screw compressors
- Vacuum pumps
- Mining machinery
- Machine tools

Current stage of development

In industrial use

Collaboration options

Marketing agreement

IPR details

Patents: None

Trademark: "ENKLO HLP"

SPECIFICATIONS

	22	32	46	68
Viscosity, cST@ 40 C	20-24	29-35	42-50	62-72
Viscosity Index, Min.	90	90	90	90
Flash point, COC, C, Min	160	180	185	210
Pour point, C, Max	(-) 18	(-) 18	(-) 18	(-) 18
Copper strip corrosion @ 100C For 3 Hrs. Max	1	1	1	1
FZG rig test, failure load stage, Min.	10	11	11	11

Heat Transfer Fluid

DESCRIPTION

- Premium quality heat transfer oil specifically developed for heat transfer system where bulk operating temperatures go up to 305°C
- Derived from finest quality petroleum base stocks and is fortified with high performance additives to enhance performance at higher temperatures

Advantages

- Ability to withstand higher operating temperatures, up to 305°C
- Reduced oxidation and thermal degradation, hence longer life
- Minimal fouling and deposit formation on heat transfer surface. Hence offers improved heat transfer

Target Countries

- All countries

Applications

- Textile industry
- Pharmaceutical industry
- Chemical and processing industry

• **Current stage of development**

In industrial use

• **Collaboration options**

Marketing agreement

• **IPR details**

Trademark: "HYTHERM"

SPECIFICATIONS

Viscosity, cST @ 40C	27-38		
Flash point, COC, C, Min	194		
Pour point, C, Max.	0		
Copper strip corrosion			
3 hr @ 100C (ASTM), Max.	1		
Neut. number mg KOH/gm, Max	0.15		
Temp, C	260	280	300
Specific heat kcal/Kg C	0.740	0.760	0.790
Thermal conductivity, kcal/hr-mt C	0.1	0.099	0.097

Organisation

Hindustan Petroleum Corporation Ltd.

Cross Reference

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Novel Antioxidant for Gasoline

DESCRIPTION

- Established as a high performance antioxidant for preserving various types of modern gasoline blend, including thermally and catalytically cracked components from FCCUs, Cokers, Vis-breakers and Pyrolysis processes
- It is a synergistic combination of patented amino-phenolic chemistry backed by Indian Oil R&D technology
- Excellent performance in ASTM D-873 (modified), ASTM D-525, ASTM D-381

Advantages

- Servo-AO has excellent gum control characteristics (5 mg/l application reduces gum from 200g/m³ to 30g/m³) besides oxidation stability, which in turn gives maximum storage life
- Optimal use of SERVO-AO minimizes the treat cost
- Free flowing fluid: Easy to handle
- Supported by Indian Oil in the form of Follow up and trouble shooting through expert technical support

Target Countries

- All countries

Applications

- Injected directly into the gasoline streams. The dosage rate depends on desired level of oxidation stability and composition of the fuel
- Refineries

• **Current stage of development**

Commercialised

• **Collaboration options**

Marketing agreement, Technology transfer

• **IPR details**

Patents: Granted in India & US

Trademark: "Servo-AO"

SPECIFICATIONS

Physical state	Liquid
Appearance	Dark Red
Sp. Gr @ 15.6°C	0.90-0.92
Flash point	25-30
Viscosity, cST @ 40°C	Min 50
Packaging	190 Kg MS drums

Organisation

Indian Oil Technologies Ltd.

Cross Reference

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