

Specialty Chemicals

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Phosphamidon Production

DESCRIPTION

- The process involves chlorination, condensation, concentration and purification.
- The process incorporates an on-line monitoring system in chlorination reactor.
- Needs appropriate effluent disposal systems.

Advantages

- Process parameter optimisation and built in plant practices reduce the pollutant emissions. Specially designed solvent recycle system enables optimum utilisation of solvent
- Estimated investment for battery limit plant of 300TPA is around Rs.25 million

Target Countries

- China
- African countries
- Other developing countries

Applications

- Manufacturers of insecticide for several crops

- **Current stage of development**
Standardised on pilot scale of 3 kg per batch product
- **Collaboration options**
Process know-how, Basic design package, Process demonstration, implementation and commissioning

SPECIFICATIONS

Raw materials

Diethylacetoacetamid
Chlorine gas
Sodium bicarbonate
Trimethyl phosphite
Monochloro benzene

Equipment

Chlorinator
Solvent distillation units
Vessels/ Tanks, Reactor, Boiler
Azeotropic distillation unit
Thin film evaporator

Organisation

Regional Research Laboratory (Jorhat)

Cross Reference

Organisation Page 169

Carboxylated Styrene Co-Polymers Speciality Additive During Compounding, and/or Standalone Product

DESCRIPTION

- Process/ Technology leads to manufacturing of caboxylated styrene copolymers in powder or emulsion form. The process include multi step polymerization through emulsion polymerisation route
- Incorporation of reactive moities capable of inducing reactivity/ interaction between pairs of unmiscible polymers like Nylon-6, polyesters and Styrenics etc

Advantages

- Use as compatibiliser for Nylon-6 alloys

Target Countries

- Europe
- Japan
- China
- North America

Applications

- As an additive for compatibilisation of immiscible polymers. Particularly styrenics
- Use as an emulsion

- **Current stage of development**
Tested, Available for demonstration
- **Collaboration options**
Further research, Development support, Information exchange
- **IPR details**
Patents: Granted

Organisation

Gujarat State Fertilisers and Chemicals Ltd.

Cross Reference

Organisation Page 154

Mineral Reinforced Nylon-6

Creation of Suitable Interphase Between Resins and Reinforcement

DESCRIPTION

- The technology includes the treatment process for the mineral surfaces to be made appropriately suitable for coupling with resin matrix
- Treatment of the mineral with suitable coupling agents and process makes them compatible with nylon-6 matrix and imparts value addition to otherwise an inexpensive mineral
- Coupling reactor between the matrix and the mineral making the composites to retain their properties under shear during processing

Advantages

- Higher thermal resistance
- Paintability online
- Predictable shrinkage

Target Countries

- Most of the developing countries

Applications

- Engineering polymer compounding
- Polymer composites mainly for uses in automotive sector

- **Current stage of development**
Commercialised
- **Collaboration options**
Further research, Development support, Information exchange
- **IPR details**
Patents: Granted

Organisation

Gujarat State Fertilisers and Chemicals Ltd.

Cross Reference

Organisation Page 154

Impact Resistant Nylon-6 Alloys & Composites

High Impact Alloys and Composites of Nylon-6 Through Reactive Processing Technologies

DESCRIPTION

- Generation of high impact alloys and composites of Nylon-6 in different range of impact resistance
- With variation in the alloying dispersed phase (type and content), range of materials with possibility of customizing as per customer requirement can be created
- Compatibilising process for the alloys, which makes the phases of generally immiscible polymer system/ stable during adverse, stresses encountered during processing

Advantages

- Impact resistance in different range
- Moisture resistance and dimensional stability
- Flexibility with no effect on thermal resistance

Target Countries

- Developing countries
- South Africa

Applications

- Engineering plastics
- Automotive sector
- Appliances
- Housings for electronics

- **Current stage of development**
Tested, Available for demonstration
- **Collaboration options**
Further research, Development support
- **IPR details**
Patents: Granted

Organisation

Gujarat State Fertilisers and Chemicals Ltd.

Cross Reference

Organisation Page 154

Sulphonated Melamine Formaldehyde

Stable, Low Salt Containing Sulphonated Melamine Formaldehyde

DESCRIPTION

- Melamine is condensed with formaldehyde in an aqueous and alkaline medium followed by sulphonation. The sulphonated mass is polymerized in acidic medium. Finally product is stabilised at an elevated temperature
- Simplified process steps with milder and non-corrosive operating conditions. Reaction cycle product is lower

Advantages

- Raw material consumption is less
- Lower reaction cycle period
- Milder and non-corrosive operating conditions

Target Countries

- Gulf countries
- European countries
- Sri Lanka
- Pakistan

Applications

- Useful for slabs, beams, columns and areas of high steel congestion and thin sections to achieve impermeable honey comb free, high quality concrete
- Highly recommended for roof slabs, water tanks, basement, foundation, floorings, bridges, dams, decks etc

• **Current stage of development**

Commercialised

• **Collaboration options**

Joint venture, Marketing agreement

• **IPR details**

Patents: Applied for

Organisation

Gujarat State Fertilisers and Chemicals Ltd.

Cross Reference

Organisation Page 154

Para Formaldehyde Production

Plant Using Evaporation and Drying Process

DESCRIPTION

- A low cost vacuum operational plant employing evaporation and drying
- Offers flexibility to produce products with 91-96% purity
- A small scaled 5 tons per day plant

Advantages

- Low cost plant: The plant costs US\$0.8 million and has a capacity of 5 Tons day
- Cheaper and smaller in size vis-à-vis those offered by the European manufacturers

Target Countries

- China and Far-East
- Middle East
- Africa

Applications

- Applicable in upstream or downstream integration
- Used as fungicides, disinfectants, adhesives, hardener, contraceptive creams
- Other applications are the same as formaldehyde's

• **Current stage of development**

In industrial use

• **Collaboration options**

Open to all options

SPECIFICATIONS

Capacity	5 Tons per day
Capital expenditure	US\$ 0.8 million
Operating costs	\$180 per ton of finished goods
Alternate technologies	None

Organisation

Simalin Chemical Industries Ltd

Cross Reference

Organisation Page 174

Water Treatment Chemicals

DESCRIPTION

- Phosphonate based blend of multimetal corrosion inhibitors, dispersants and scale inhibitor
- Combats corrosion and scale problems in cooling water applications
- It has a good hydrolytic stability and sequestration properties, useful for cooling water systems
- National Award Winner–1993

Advantages

- Scalewin-1
Zinc phosphate based corrosion and scale inhibitor, which can be used for trouble free operation of most of the cooling water systems
- Scalewin-2
Azole based synergistic blend of multimetal corrosion and scale inhibitor suitable for copper and brass metal based cooling water systems including power plant

Target Countries

- All countries

Applications

- Power plant cooling tower/ cooling water system
- Circulating cooling water system for heat exchangers in chemical process plants

- **Current stage of development**
Commercialised
- **Collaboration options**
Marketing agreement
- **IPR details**
Secret know-how

SPECIFICATIONS

Scalewin-1 Appearance	Colourless to pale yellow liquid
Sp. Gravity	1.050.05gm/cc
pH	less than 2
Scalewin-2 Appearance	Pale yellow liquid
Sp. Gravity	1.1 ± 0.05gm/cc

Organisation

Gujarat Alkalies & Chemicals Ltd

Cross Reference

Organisation Page 153

Leather Finishing Chemicals

Casein & Casein-Free Leather Pigment Finishes

DESCRIPTION

- Improvement in grinding operation for the pigment which saves electric power and man power
- Improvement in additives
- In market only parent colours are available -Alchemy does Colour Matching (colours required by the tanners) thereby saving inventory

Advantages

- Better covering on the leather thereby saving cost for the tanner
- Life duration is increased

Target Countries

- Sri Lanka, Bangladesh, Nepal
- Hong Kong, China
- East Africa (Tanzania), other African countries
- Italy, China, Germany, Vietnam, Indonesia

Applications

- Finishing leathers

- **Current stage of development**
In industrial use
- **Collaboration options**
Marketing agreement
- **IPR details**
Secret know-how
Trademark: "ALCHEM"

Organisation

Alchemy Leather Pigments & Auxiliaries Pvt. Ltd

Cross Reference

Organisation Page 141

Clarizyme

Alkaline Protease Enzyme for Dehairing

DESCRIPTION

- A solid-state fermentation technique for enzyme production by *Aspergillus flavus* strain using wheat bran as substrate. This new enzyme formulation loosens hair from skins and allows recovery of hair as saleable product
- Eliminates bating step in leather processing. Enzyme has good caseinolytic activity over a broad pH range with no effect on the collagen or elastin

Advantages

- Improves quality of the leather
- Solid-state fermentation facilitates enzyme storage in dry form
- This process affords clean option for dehairing and an alternative to the polluting chemical route of lime and sulphide
- A plant with a capacity of 300 TPA will cost approximately USD 0.2 million

Target Countries

- All leather producing countries

Applications

- A microbial depilant, an alternative to conventional chemical process for removal of hair from skins

- **Current stage of development**
Process standardized on bench scale
- **Collaboration options**
Technology Transfer

SPECIFICATIONS

Raw materials

Wheat bran

Equipment

Autoclaves
Kneader mixers
Pulverizer
Perforated trays
Hot air-blowing system

Organisation

Central Leather Research Institute

Cross Reference

Organisation Page 146

Butyl Hydroxy Toluenes (BHT)

DESCRIPTION

- Butylated Hydroxy Toluenes (BHT) is produced by catalytic alkylation of p-cresol with isobutylene
- The product meets international specifications
- Normal effluent treatment measures are sufficient

Advantages

- Optimization of process ensures less operational cost
- Mixture of cresol isomers can also be used as feed and Butylated m-cresol can be separated
- Estimated investment for a battery limit plant of 500 TPA is around USD 0.6 million

Target Countries

- All countries

Applications

- Used as general purpose antioxidant in lubricants gasoline, speciality oils, polymers, textile and leather oils

- **Current stage of development**
Process standardized at pilot scale one licensee
- **Collaboration options**
Process know-how, Demonstration

SPECIFICATIONS

Raw materials

Isobutene/C4 stream
P-cresol
Solvent
Sodium carbonate
Sulphuric acid

Equipment

Reactor
Storage tank
Centrifuge
Distillation column
Dryer
Neutralisation vessels

Organisation

Indian Institute of Petroleum

Cross Reference

Organisation Page 160

Boiler Feed Water Conditioning Treatment

DESCRIPTION

- An effective feed water conditioning programme to control corrosion, scaling and deposit formation in any steam generating system
- Film forming amines provide better protection against corrosion and deposits and also extends it to after boiler (Turbine Heat Exchange) condensate mixes for protection against oxygen related corrosion

Advantages

- Comprehensive corrosion control: Impenetrable polyamine film provide physical barrier to corrodants
- Energy Savings: Fully organic product does not add to system TDS, resulting in reducing blow down and hence fuel efficiency
- Non-Toxic: A single dose liquid replaces conventionally used Sulphide, Hydrazine, Morpholine, Phosphate etc

Target Countries

- Bangladesh, Sri Lanka
- Thailand, Indonesia, Vietnam, Malaysia
- Middle East

Applications

- Steam Generating Boilers in Process/ Power plants
- Tested and proven on steam generating boilers of up to 160 Bar
- Applied to all kinds of industries: Sugar, Paper, Textiles, Petrochemicals and Oil Refineries

- **Current stage of development**
Commercialised
- **Collaboration options**
Technical co-operation
- **IPR details**
Trademark: "Eloguard /Elomine"

SPECIFICATIONS

Appearance	White to colourless Liquid
Odour	Ammoniacal
pH	Above 11
Temperature stability	550 degree C
Freezing point	-1 degree C
Density	0.98 +/- 0.1
Toxicity	Ld50 on rat oral 55 g/kg
Environmental impact	None

Organisation

Elof Hansson

Cross Reference

Organisation Page 151

Dimers of Alpha Methyl Styrene Intermediate for Polymer Reaction

DESCRIPTION

- Speciality product manufactured by dimerisation of AMS using special catalyst system
- Reaction quite complex and requires control of process condition to achieve desired quality

Advantages

- Globally a first mover
- Better than sulphur on application (could replace sulphur based mercaptan)
- Cost competitive
- Having a purity exceeding 98.5%

Target Countries

- USA
- Western Europe (Spain)
- East Asia (Japan, Korea)
- Israel
- Russia (CIS)

Applications

- Molecular weight modifier in radical homo-polymerisation and copolymerisation of Olefinic Monomers such as Styrene, Alkyl Styrene, Acrylonitrile, Acrylates and Alkyl Acrylates
- Process Industries based on polymer reactions

- **Current stage of development**
In industrial use
- **Collaboration options**
Marketing agreement
- **IPR details**
Secret know-how
Trademark: "Herdillia"

SPECIFICATIONS

Appearance	Colourless Liquid
Colour, HU, (max.)	20
Purity as unsaturated Dimers, % By mass, (min.)	98.0
Unsaturated Dimer content, percent by mass	
Substituted 1-pentene	93.1
Substituted 2-pentene	7.1
Saturated Dimer, percent by mass, (max.)	1.0
AMS Monomer, percent by mass, (max.)	0.5
Specific gravity, 27C / 27C	0.980 0.990
Boiling Point, C	300-320

Organisation

Schenectady Herdillia Limited

Cross Reference

Organisation Page 173

Diphenyl Oxide Ether

Speciality Chemical for Process Industry and Perfumery Compounding

DESCRIPTION

- The process is based on high temperature vapour-phase dehydration of phenol over a novel unsupported catalyst
- A commercial scale plant designed for a capacity of 3000 MTA (Metric tons per annum)

Advantages

- Produced by chloride free route so not hazardous to health
- Produced by a cleaner process using rare solid catalyst developed in-house

Target Countries

- USA
- Western Europe (Spain)
- East Asia (Japan, Korea)
- Israel
- Russia

Applications

- Process industry (Heat transfer media, surfactant, flame retardants, blowing agents)
- Perfumery compounding like alkylated DPO disulphonate

- **Current stage of development**
In industrial use
- **Collaboration options**
Marketing agreement
- **IPR details**
Secret know-how
Trademark: "Herdillia"

SPECIFICATIONS

Appearance	Clear Liquid
Colour, HU, (max.)	20
Purity (Percent of mass) Min	99%
Specific gravity, 27C / 27C	1.070-1.076
Chlorine, mg/Kg (Max)	5.0

Organisation

Schenectady Herdillia Limited

Cross Reference

Organisation Page 173

Sodium Chloride

A.R. & I.P. Grade Sodium Chloride

DESCRIPTION

- Simple process involving washing of raw salt, preparation of saturated brine; removal of impurities in brine by precipitation followed by filtration and then forced evaporation
- Normal effluent treatment measures are sufficient

Advantages

- Estimated investment for a battery limit plant of 50 TPA is around USD 0.01 million

Target Countries

- All countries

Applications

- In laboratory work and in pharmaceutical preparations

- **Current stage of development**
Process standardized at pilot scale
- **Collaboration options**
Technology Transfer

SPECIFICATIONS

Raw materials

Crude salt
Lime
Soda ash

Equipment

Storage tanks
Tray driers
Precipitation tanks
Pumps
Boiler Evaporation pans

Organisation

Central Salt & Marine Chemicals
Research Institute

Cross Reference

Organisation Page 147

Vanadium Pentoxide

Recovery from Vanadium Bearing Sludges of Alumna Industry

DESCRIPTION

- Simple, low capital process involves dissolution of sludge in water followed by filtration, acidification and precipitation
- Needs appropriate disposal systems

Advantages

- Simple, low capital process
- Estimated investment for a battery limit plant of 3 TPD of sludge (in 3 shifts) is around US \$ 0.13 million
- Enables 90% of vanadium recovery with over 98% purity

Target Countries

- South American Countries
- African countries
- China

Applications

- In production of Ferro-vanadium, which is used in alloy steels, and for catalyst to produce sulphuric acid

Current stage of development

Process standardized at a scale of 2 TPD of sludge

Collaboration options

Process know-how, Plant lay out, QA methods, Data on effluents, implementation and commissioning

SPECIFICATIONS

Raw materials

Vanadium sludge of average 10% V₂O₅
Hydrochloric acid
Ammonium chloride

Equipment

Leaching, precipitation & storage tanks
Filter press
Centrifuge
Drier
Muffle furnace
Centrifugal & acid pumps

Organisation

National Metallurgical Laboratory

Cross Reference

Organisation Page 165

Calixarenes

DESCRIPTION

- Calixarenes have a unique bucket-like structure with hydrophobic binding pockets on the upper rim and spherand-like cation binding sites on the lower rim

Advantages

- A unique cost-effective process for producing Calixarenes
- High melting points
- Very high thermal and chemical stability with low solubility in many solvents
- Low toxicity

Target Countries

- All countries

Applications

- Highly versatile in application
- These molecules can be tailored for separation and other processes such as sensors, catalysts, intermediates etc. in a wide range of applications in the industry
- Applied in chemistry, biochemistry and pharmaceutical industry

Current stage of development

Commercialised

Collaboration options

Open to all options

Organisation

DCM Shriram Consolidated Limited

Cross Reference

Organisation Page 150

Industrial Aerosol Sprays

Aerosol Formulation for Industrial Maintenance Applications

DESCRIPTION

- Industrial aerosol sprays such as Cleaners, Lubricants, Rust Preventives, Protective Coatings, Mould Release Agents, Conformal Coatings for PCBs

Advantages

- Environmental friendly, Saves time energy & money
- Instant maintenance, Efficient results

Target Countries

- All countries

Applications

- All types of industries such as textile, automobile, engineering, electrical & electronic industries, shipping, defence, railways

- Current stage of development**
In industrial use
- Collaboration options**
Joint venture, Royalty

Organisation

DCM Shriram Consolidated Limited

Cross Reference

Organisation Page 150

Potassium Persulphate An Oxidant

DESCRIPTION

- A powerful oxidant, soluble in 50 parts of water (insoluble in Alcohol), with good stability at room temperature
- Decomposes gradually by losing available oxygen (5.8%), at high temperature decomposition is rapid

Advantages

- Soluble in 50 parts of water
- Good stability at room temperature

Target Countries

- USA
- Europe

Applications

- Catalyst in polymerisation of monomers like Acrylonitrile, Styrene butadiene, Vinyl chloride, Vinyl acetate and Acrylic esters
- Bleaching agent in textiles, Soaps and Pharmaceutical industries
- In Photography ("ANTHION") to remove traces of Triosulphate (Hypo) from plates and paper
- Analytical chemistry

- Current stage of development**
In industrial use
- Collaboration options**
Information exchange, Research, Technical co-operation

SPECIFICATIONS

Appearance	White crystalline powder
M. Formula	K ₂ S ₂ O ₈
M. Wt.	270.32
Composition	
Solubility	
Stability	Good at room temperature
pH	Alkaline
Environment liability	None (avoid prolonged contact with skin)

Organisation

Gujarat Persalts Private Limited

Cross Reference

Organisation Page 155

Flame Retardant Nylon-6 Production Through Reactive Processing Techniques

DESCRIPTION

- The technology/process leads to generation of environmental friendly Nylon-6 and its composites (glass fibre and mineral) having V-0 class of flames resistance characteristics suitable for markets in electrical and electronic sector
- Variation in level of reinforcements like glass and mineral, and colourability makes these materials/processes amenable to customisation as per customer requirement

Advantages

- Low smoke generation during fire vs competitive materials
- Less corrosive to processing machines
- No major sacrifice in other materials properties
- Cost effective vs. competitive materials

Target Countries

- South Africa
- Most of developing countries
- Textile manufacturing countries

Applications

- Applicable to engineering polymer compounding and polymer composites
- Serving electrical and electronic sector

- **Current stage of development**
Tested, Available for demonstration
- **Collaboration options**
Further research, Development support
- **IPR details**
Patents: Applied for

SPECIFICATIONS

V-0 FR (Flame Resistance) rating as per UL 94 testing procedures

Organisation

Gujarat State Fertilisers and Chemicals Ltd.

Cross Reference

Organisation Page 154

Reactive Distillation Technology

DESCRIPTION

- Pilot Plant at IITB with capacity of 20 Kg/day (Esterification reaction)
- Can be used to separate near boiling mixtures
- Used for production of Butyl Acetate and Lactic Acid Recovery at Lab stage

Advantages

- Lower energy as no separate distillation process
- Lower equipment cost
- Automatic temperature control

Target Countries

- All countries

Applications

- Any reversible liquid phase reaction
- Hydrogenation
- Etherification

- **Current stage of development**
Process standardized on pilot scale
- **Collaboration options**
Technical support and process know-how

Organisation

Indian Institute of Technology, Bombay

Cross Reference

Organisation Page 161

Activated Carbon from Natural Woody Resources

DESCRIPTION

- Process to produce activated carbon from Bamboo
- Formation involves two steps, first carbonisation and then activation
- Lab scale unit producing 0.5 kg/batch

Advantages

- Readily available source of carbon
- Unique technology

Target Countries

- Tropical countries
- South America
- South Asia

Applications

- Adsorbant
- Fuel
- Catalyst

- **Current stage of development**
Process standardised on pilot scale
- **Collaboration options**
Technical support and process know-how

Organisation

Indian Institute of Technology, Bombay

Cross Reference

Organisation Page 161

Soil Biotechnology (SBT) Waste Processing and Utilization

DESCRIPTION

- Concerned with recovery of value from wastes
- Process works at mesophelic temperatures and engages a formulated media integrated in a system open to atmosphere
- Process monitoring is achieved by observing bio-indicators of abnormality
- Control is achieved by regulating loading, additives and moisture

Advantages

- Green technology does not generate any harmful waste products
- Data from available field scale facilities indicate that SBT is far superior to any existing technology both in terms of investment and recurring costs
- Viable both in very small to large scale

Target Countries

- All countries

Applications

- Waste water processing for reuse
- Non chemical cleaning of swimming pools
- Bath and wash water for recycling for use in toilets
- Municipal and industrial waste water treatment
- Retrofitting conventional energy intensive systems
- Solid waste conversion to culture grade to fertiliser to soil grade products
- Pest control in soil and water

- **Current stage of development**
Commercialised
- **Collaboration options**
Technical know how, commissioning and technical services
- **IPR details**
Patents: Applied for (2)

SPECIFICATIONS

Municipal liquid waste Technology parameter	SBT gardens	Activated sludge process
Plant cost (Cr)/10 MLD	3.25	3.5
Net area of plant (sq.m)	185*185	95*95
Bacteria removal (incl. E.Coli) %	99.99%	70%
Total profit in (Lacs/ year)	12	-92
Return on investment	4%	-26%

Organisation

Indian Institute of Technology, Bombay

Cross Reference

Organisation Page 161

Preparation of Flux Based on Triple Salts

DESCRIPTION

- It is a flux based on triple salts
- The process involves three steps of chemical synthesis to get the desired products
- 20-30% aqueous solution is used for the fluxing of the articles to be galvanised

Advantages

- Reduces the wastage of zinc as dross during the galvanising of iron and iron based alloys
- Pollution problems reduced because of use of ZnCl₂/NH₄Cl is also reduced

Target Countries

- Developing countries

Applications

- Useful for prefixing in dry galvanising of iron and steels

- **Current stage of development**
In industrial use
- **Collaboration options**
Open to all options
- **IPR details**
Secret know-how

SPECIFICATIONS

Raw materials

ZnCl₂, NH₄Cl and other two chlorides, surfactants etc

Techno economics

Plant with a capacity of 600 TPA will cost Rs 200 Lakhs. ROI is 25% at selling price of Rs 30,000 per ton

Equipment

Reaction Vessels, Boiler, Filter press, Centrifuge etc.

Organisation

National Metallurgical Laboratory, Jamshedpur

Cross Reference

Organisation Page 165

Production of Tabular Alumina from Indigenously Available Calcined Alumina

DESCRIPTION

- The process involve are mixing, pelletising & sintering
- The sintered pellets are then crushed, ground & sieved to desired fractions followed by magnetic separation

Advantages

- No effluent problem
- No pollution hazards
- Grains contains minimum 99.5% alumina
- Apparent porosity 4-5%

Target Countries

- Developing countries

Applications

- Manufacture of special refractories such as slide gate bricks etc

- **Current stage of development**
Lab scale
- **Collaboration options**
Open to all options
- **IPR details**
Secret know-how

SPECIFICATIONS

Raw materials

Calcined alumina mix (99.5% Al₂O₃) and additives
Techno economics
Plant with 600 TPA capacity would cost Rs 200 lakhs. The ROI works out to be 50% at a selling price of Rs 50,000/- per tonne of tabular alumina

Equipment

Mixer, Briquetting press, High temperature furnace, Jaw crusher, Roll crusher, Ball mill and magnetic separator

Organisation

National Metallurgical Laboratory, Jamshedpur

Cross Reference

Organisation Page 165

Recovery of Vanadium Pentoxide from Vanadium Bearing Sludges of Alumina Industry

DESCRIPTION

- The process involves the dissolution of sludge in water & filtration followed by the acidification of the filtrate. The Vanadium is then precipitated out from the acidified solution

Advantages

- Enables 90% Vanadium recovery
- Purity 98%

Target Countries

- Developing countries

Applications

- It finds application for production of ferro-vanadium which is used in alloy steels and also catalyst to produce sulphuric acid

- Current stage of development**
In industrial use
- Collaboration options**
Open to all options
- IPR details**
Secret know-how

SPECIFICATIONS

Raw materials

Vanadium sludge (average 10% V₂O₅), Hydrochloric acid, Ammonium chloride

Techno economics

Plant with a treating capacity of 2 to 3 tonne of sludge/day costs approximately 100 lakhs

Equipment

Leaching, precipitation & storage tanks, Filter press, Centrifuge filter, Drier, Muffle furnace, Centrifugal pumps, Acid pumps etc.

Organisation

National Metallurgical Laboratory, Jamshedpur

Cross Reference

Organisation Page 165

Producing Lithium Carbonate from Indian Lithium Bearing Mineral - Lepidolite

DESCRIPTION

- The process involves roasting of ground ore with alkali sulphate followed by water leaching and subsequently treating with carbonate salt
- Process developed at a scale of 2 kg/day Lithium carbonate

Advantages

- 90-92% recovery of Lithium
- Purity of Lithium carbonate is 98%
- Process is environment friendly

Target Countries

- Developing countries

Applications

- Ceramics, steel, as fluxing agent, glass lining of water heaters, glass, production of other Lithium chemicals including Lithium metal

- Current stage of development**
In industrial use
- Collaboration options**
Open to all options
- IPR details**
Secret know-how

SPECIFICATIONS

Raw materials

Lepidolite, alkali sulphate, carbonate salts, water, steam etc.

Techno economics

Process for 30 TPA lithium carbonate based on 100% capacity utilization, the return on investment will be 40%

Equipment

High temperature continuous furnace, constant stirred tank reactor, solid-liquid separation unit

Organisation

National Metallurgical Laboratory, Jamshedpur

Cross Reference

Organisation Page 165

Recovery Of Nickel from Spent Nickel Catalyst

DESCRIPTION

- Process consists of mixing, heating and reduction to get Ferro-nickel
- The process developed at 5 kg/batch of spent catalyst

Advantages

- 95% Nickel recovery
- For environmental considerations no special measures are required

Target Countries

- Developing countries

Applications

- Useful for alloying element in making of alloy steel

- **Current stage of development**
In industrial use
- **Collaboration options**
Open to all options
- **IPR details**
Secret know-how

SPECIFICATIONS

Raw materials

Spent nickel catalyst, Mill scale (iron oxide), reducing agents etc

Equipment

Oil/gas fired furnace, Reaction vessels

Techno economics

Plant with a capacity to process 2 tons/day of the spent catalyst costs approximately Rs 15 lakhs

Organisation

National Metallurgical Laboratory, Jamshedpur

Cross Reference

Organisation Page 165

Production of high-grade Wolframite conc./APT from lean tungsten ores

DESCRIPTION

- The process was developed on a 25 tpd basis of feed

Advantages

- Can utilize low-grade tungsten ores (0.1% WO₃) through an integrated approach (physical+ chemical) to APT
- No deleterious effects from rejects on environment

Target Countries

- Developing countries

Applications

- Useful for lump filaments, high-speed tools, discs, wear resistant parts, engine valves, circuit breakers, chemicals for textiles etc.

- **Current stage of development**
In industrial use
- **Collaboration options**
Open to all options
- **IPR details**
Secret know-how

SPECIFICATIONS

Raw materials

Tungsten ore, reagents for floatation and chemicals for solvent extraction, leaching and refining

Techno economics

Plant with 100 tpd capacity will require a capital investment of Rs. 425 lakhs

Equipment

Crusher, Grinder, Sizing units, WHIMS, Floatation units, Vainer thickener, Filter, Autoclave, Solvent extraction units, Purifiers, Crystallisers

Organisation

National Metallurgical Laboratory, Jamshedpur

Cross Reference

Organisation Page 165

Recovery of Valuable Minerals from Beach Sands and Production of Clean Concentrates of Zircon, Sillimanite, Ilmenite, Garnet, Monazite etc

DESCRIPTION

- Selected physical separation steps are employed involving gravity, magnetic, high tension separation and floatation techniques
- Process is developed both at bench & pilot plant scale, upto 1 tph

Advantages

- No special provision required for environmental considerations

Target Countries

- Developing countries

Applications

- Manufacture of superior value-added products

- **Current stage of development**
NA
- **Collaboration options**
Open to all options
- **IPR details**
Secret know-how

SPECIFICATIONS

Raw materials

Beach sand heavy minerals

Equipment

Gravity, Magnetic, HT separation, Floatation cells, Grinding mills etc

Organisation

National Metallurgical Laboratory, Jamshedpur

Cross Reference

Organisation Page 165

Production of Chemical Manganese Dioxide

DESCRIPTION

- Process does not require electrolysis and post grinding like Electrolytic Manganese Dioxide (EMD)
- The scale of process development being batch wise is @ 1 kg/batch

Advantages

- Process requires 50% less energy than EMD
- Gives valuable by-product Ammonium sulphate
- Environment friendly process

Target Countries

- Developing countries

Applications

- Useful in dry cell batteries/special particular type batteries in which only CMD is used

- **Current stage of development**
Ready for commercialisation
- **Collaboration options**
Open to all options
- **IPR details**
Secret know-how

SPECIFICATIONS

Raw materials

Manganese ore, Sulphuric acid, Ammonium carbonate
Techno economics
The project cost for 2000 TPA is Rs. 650 lakhs with the working capital for 45 days of Rs 280 lakhs. The ROI is 30% and the Break-even point is 56%

Equipment

Jaw crusher, Roll crusher, Ball mills, Rotary kiln, Leaching reactor, Storage tanks, Filter and pumps, Boilers etc

Organisation

National Metallurgical Laboratory, Jamshedpur

Cross Reference

Organisation Page 165

Production of Electrolytic Manganese Dioxide

DESCRIPTION

- The scale of the project developed is 50 kg/day

Advantages

- Utilizes low and medium grade manganese ore
- Equipments are indigenously available

Target Countries

- Developing countries

Applications

- Useful in dry cell batteries

- Current stage of development**
In industrial use
- Collaboration options**
Open to all options
- IPR details**
Secret know-how

SPECIFICATIONS

Raw materials

Manganese ore, Sulphuric acid
Techno economics
 The project cost for 2000 TPA is Rs. 1800 lakhs and with the working capital-Raw material (45 days) of Rs. 162 lakhs. Profitability analysis indicates that the ROI is 31% and the Break-even point is 80%

Equipment

Jaw Crusher, Roll crusher, Ball mills, Rotary kiln, Leaching reactor, Storage tanks, Filter and pumps, Boilers, Rectifier, Cells etc

Organisation

National Metallurgical Laboratory, Jamshedpur

Cross Reference

Organisation Page 165

Production of Castings By in Mould Treatment With Electric Current

DESCRIPTION

- Process is developed at laboratory scale. Upto 0.5 kg ingot casting was conducted
- Process can be "tailor made" for individual castings depending on its shape, geometrical factors and chemical composition

Advantages

- Process eliminates use of Hexachloroethane used for degassing of molten aluminium alloys
- Process is environment friendly

Target Countries

- Developing countries

Applications

- Used for Al-alloy castings to reduce its gas porosity, refine cast structure and improve mechanical strength

- Current stage of development**
Lab scale
- Collaboration options**
Open to all options
- IPR details**
Secret know-how

SPECIFICATIONS

Raw materials

Cast grades of Al-alloys or equivalent
Techno economics
 The process economics study needs to be explored with trials on different types of castings. Investment required on power supply unit, its size depends on capacity of production unit.

Equipment

AC/DC power supply upto 12 volts with special arrangements to connect the moulds. Suitable Al-alloy melting units sand moulding systems

Organisation

National Metallurgical Laboratory, Jamshedpur

Cross Reference

Organisation Page 165

Total Lime and Sulphide Free Dehairing in hides/Skins Using Enzymes

Formaldehyde Free Polymeric Syntan

DESCRIPTION

- Enzymatic process to completely eliminate lime/sulphide conventionally used
- The enzymes are extracted from both animal as well as plant sources

Advantages

- Eco-friendly process to produce dehaired pelt without adding to the effluent load

Target Countries

- Developing countries

Applications

- Dehairing in tanning industry

- **Current stage of development**
In industrial use
- **Collaboration options**
Open to all options
- **IPR details**
Patents: Applied for

Organisation

Central Leather Research Institute,
Chennai

Cross Reference

Organisation Page 146

DESCRIPTION

- The product is essentially an organo-polymeric matrix, which is free from Formaldehyde

Advantages

- Possible to avoid pickling operation by using this syntan which emerges as an effective solution for tackling the problem of TDS associated with the effluent of leather processing industry

Target Countries

- Developing countries

Applications

- Potential application in chrome tanning of leather as an exhaust aid for chrome

- **Current stage of development**
In industrial use
- **Collaboration options**
Open to all options
- **IPR details**
Patents: Applied for

Organisation

Central Leather Research Institute,
Chennai

Cross Reference

Organisation Page 146

Chromium-Silica Tanning Agent

DESCRIPTION

- Synthetic mineral tanning agent containing matrix of Chromium and Silica complexed with organic ligands
- Manufacturing process involve are complexation and drying

Advantages

- Product exhibits about 85-95% exhaustion for both Chromium and Silica
- The leather produced by this syntan exhibits excellent fullness with shrinkage temperature of more than 105C

Target Countries

- Developing countries

Applications

- Used as a self-tanning agent as well as retanning agent

- **Current stage of development**
In industrial use
- **Collaboration options**
Open to all options
- **IPR details**
Patents: Applied for

SPECIFICATIONS

Raw materials

Hexavalent chromium salt, silica salt, reducing agent, organic ligand

Techo economics

The plant with capacity of 200 TPA requires investment of Rs. 500 lakhs

Equipment

Glass lined reactors, Boiler, Spray, Drier, Scrubber, Filter

Organisation

Central Leather Research Institute, Chennai

Cross Reference

Organisation Page 146

Chromium-Iron Tanning Agent

DESCRIPTION

- Synthetic mineral tanning agent containing matrix of chromium and iron complexed with organic ligands
- Manufacturing process used is complexation followed by drying

Advantages

- Product exhibits around 90-95% exhaustion of both chromium and iron
- Produce leather exhibiting shrinkage temperature of more than 105C

Target Countries

- Developing countries

Applications

- Self-tanning agent to produce fuller leather without any drawn grain appearance
- Natural aid for developing various shades based on black and brown, on leathers tanned with this tanning agent by adding non-dye external aids

- **Current stage of development**
In industrial use
- **Collaboration options**
Open to all options
- **IPR details**
Patents: Applied for

SPECIFICATIONS

Raw materials

Hexavalent chromium salt, Iron salt, reducing agent, organic ligand

Techo economics

The plant with capacity of 150 TPA requires investment of Rs 400 lakhs

Equipment

Glass lined reactors, Boiler, Spray, Drier, Scrubber, Filter

Organisation

Central Leather Research Institute, Chennai

Cross Reference

Organisation Page 146

Organo-Metallic Polymeric Syntan

DESCRIPTION

- Its an organic polymeric matrix with ligating sites capable of anchoring metal ions like zirconium, titanium, chromium, aluminium
- Manufacturing process used is sulphonation and condensation followed by drying

Advantages

- Product exhibits around 90-95% exhaustion of metal ion
- Resistant to precipitation of upto pH as high as 5-6, facilitating higher neutralization during post tanning wet operations in leather processing

Target Countries

- Developing countries

Applications

- Self-tanning agent to produce fuller leather without any drawn grain appearance

- **Current stage of development**
In industrial use
- **Collaboration options**
Open to all options
- **IPR details**
Patents: Applied for

SPECIFICATIONS

Raw materials

Aromatic hydrocarbon, sulphuric acid, metal salt, organic ligand

Techno economics

Plant with a capacity of 200 TPA requires investment of Rs. 500 lakhs

Equipment

Glass lined reactors, Boiler, Spray Drier, Scrubber and Filter

Organisation

Central Leather Research Institute, Chennai

Cross Reference

Organisation Page 146

Synthetic Aluminium Tanning Agent

DESCRIPTION

- A formaldehyde free organic matrix irreversibly bonded with aluminium with the help of organic ligands in combination with critical additives having ligating sites
- Manufacturing process used is sulphonation and complexation followed by drying

Advantages

- The white base of the leather enhances dyeability and acts as dye saver
- Leathers tanned with this product do not show any discolouration on ageing

Target Countries

- Developing countries

Applications

- Self-tanning agent for producing white and soft leather
- Used as retanning and co-tanning agent with BCS, whereby it enhances chrome exhaustion

- **Current stage of development**
In industrial use
- **Collaboration options**
Open to all options
- **IPR details**
Patents: Applied for

SPECIFICATIONS

Raw materials

Aromatic hydrocarbon, sulphuric acid, Aluminium salt, Organic ligand, Polyfunctional polymer

Techno economics

Plant with capacity of 100 TPA with investment requirement of Rs 400 lakhs

Equipment

Glass lined reactors, Boiler, Spray drier, Scrubber and Filter

Organisation

Central Leather Research Institute, Chennai

Cross Reference

Organisation Page 146

Aluminium Based Syntan (Alutan)

DESCRIPTION

- A synthetic tanning material based on complexed aluminium, naphthalein sulphonic acid formaldehyde condensed product as the base matrix
- Primary manufacturing processes used are sulphonation, condensation and complexation followed by secondary process drying

Advantages

- Eco-friendly process for tanning
- Partial replacement for chrome, exhibiting high exhaustability
- Produces soft, supple, full and white leather with little stretch
- Ensures good brilliance with less amount of dye

Target Countries

- Developing countries

Applications

- Tanning industry
- Suede leather

- **Current stage of development**
In industrial use
- **Collaboration options**
Open to all options
- **IPR details**
Patents: Applied for

SPECIFICATIONS

Raw materials

Aromatic compounds, sulphuric acid, amino resins, aluminium salt, chromium salt

Techno-economics

Plant with a capacity of 3 TPA requires investment of Rs 700 lakhs

Equipment

Glass lined reactors, boiler, spray drier, scrubber and filter

Organisation

Central Leather Research Institute, Chennai

Cross Reference

Organisation Page 146

High Performance Syntan Based on Aluminium and Chromium (ALCROTAN)

DESCRIPTION

- A synthetic mineral tanning agent containing chromium and aluminium complexed, naphthalein sulphonic acid being the base matrix
- Primary manufacturing processes used are sulphonation, condensation, complexation and neutralization followed by secondary process drying

Advantages

- Product exhibits about 96% exhaustability
- Ensures rich & uniform dyeing and produces soft and full leather without loaded feel

Target Countries

- Developing countries

Applications

- Retanning agent
- Self-tanning agent

- **Current stage of development**
In industrial use
- **Collaboration options**
Open to all options
- **IPR details**
Patents: Applied for

SPECIFICATIONS

Raw materials

Aromatic compounds, Sulphuric acid, Amino resins, Aluminium salts

Techno-economics

Plant with a capacity of 3 TPA requires investment of Rs 700 lakhs

Equipment

Glass lined reactors, boiler, spray drier, scrubber and filter

Organisation

Central Leather Research Institute, Chennai

Cross Reference

Organisation Page 146

Vegetable Tanning Extract

DESCRIPTION

- The extract is manufactured from individual as well as blended vegetable tanning materials
- The process involves size reduction, leaching, concentration, bleaching, spray drying and drying

Advantages

- Eco friendly process

Target Countries

- Developing countries

Applications

- Leather Tanning

- **Current stage of development**
In industrial use
- **Collaboration options**
Open to all options
- **IPR details**
Patents: Applied for

SPECIFICATIONS

Raw materials

Tanniferous plant materials like Wattle, Myrobalan, Avaram etc

Techno economics

Plant with a capacity of 16 Tons per day requires investment of Rs 2000 lakhs

Equipment

Stainless steel simulated counter current leaching system, triple effect evaporator, finisher, spray drier, crusher, bleaching vessel, boiler, conveyor, electrical hoists

Organisation

Central Leather Research Institute, Chennai

Cross Reference

Organisation Page 146

Acrylic Syntan

DESCRIPTION

- The process involves copolymerization of marine oil under controlled conditions to obtain product of desired chain length and functional properties

Advantages

- Leathers treated with acrylic syntan have fullness, tightness of grain, good buffing characteristics and improved dye intensity

Target Countries

- Developing countries

Applications

- Retanning material for chrome tanned leather

- **Current stage of development**
In industrial use
- **Collaboration options**
Open to all options
- **IPR details**
Patents: Applied for

SPECIFICATIONS

Raw materials

Sulphated fish oil, Acrylic acid, Methacrylic acid, Alginic acid, Butyl acrylate, Potassium persulphate, Sodium metabisulphate

Techno-economics

Plant with a capacity of 3 tons per day requires investment of Rs 75 lakhs

Equipment

Acid resistant glass lined S.S. reactor with accessories, anchor type stirrer, SS gear pump, boiler

Organisation

Central Leather Research Institute, Chennai

Cross Reference

Organisation Page 146

Protein Based Syntan Cum Filler

DESCRIPTION

- The process involves co-polymerisation of protein Hydrolysate with Acrylic resin to obtain a composite of molecular weight in the range of 15000-20000 KD

Advantages

- Product ensures exhaustion of dye bath to the tune of 98%
- Resulting leather becomes more amenable to buffing for corrected grain as well as suede leathers
- This technology provides an economical as well as eco-friendly option of utilizing proteinous wastes of any industry for preparing value added products

Target Countries

- Developing countries

Applications

- Filler cum syntan in leather processing industry
- Processing glazed finished leathers

- Current stage of development**
In industrial use
- Collaboration options**
Open to all options
- IPR details**
Patents: Applied for

SPECIFICATIONS

Raw materials

Proteinous material like leather shavings/ trimmings, fleshings, buffing dust, acrylate, antimicrobial agent

Techno-economics

Plant with a capacity of 3 tons per day requires investment of Rs 700 lakhs

Equipment

Round bottom flask, autoclave, beaker/container with stirrer

Organisation

Central Leather Research Institute, Chennai

Cross Reference

Organisation Page 146

Keratin Hydrolysate

DESCRIPTION

- A mixture of low molecular weight polypeptides, in the form of powder, prepared by keratinous proteins with alkali, followed by concentration and spray drying

Advantages

- Better compatibility in comparison to conventional synthetic leather fillers because of its proteinous nature

Target Countries

- Developing countries

Applications

- Use as retanning agent as well as filler in leather processing industry
- For upgradation of the lower grades of leathers by selective filling to ensure imparting fullness

- Current stage of development**
In industrial use
- Collaboration options**
Open to all options
- IPR details**
Patents: Applied for

SPECIFICATIONS

Raw materials

Keratinous materials like poultry feathers, animal hair, horn, hoof, alkali like Sodium hydroxide

Techno-economics

Plant with a capacity of 600 kgs per day requires investment of Rs 120 lakhs

Equipment

Hollander beater, digester, filter press, evaporator, spray drier

Organisation

Central Leather Research Institute, Chennai

Cross Reference

Organisation Page 146

Phosphated Fatliquor

DESCRIPTION

- The process involves interesterification of glycerides of low I.V. veg/ marine/ animal oil, and subsequent phosphating of the ester under hot air current in the presence of catalyst at 80-90C

Advantages

- Leathers treated with acrylic syntan have fullness, tightness of grain, good buffing characteristics and improved dye intensity

Target Countries

- Developing countries

Applications

- Leather industry
- Textile industry
- Cosmetic industry

Current stage of development

In industrial use

Collaboration options

Open to all options

IPR details

Patents: Applied for

SPECIFICATIONS

Raw materials

Vegetable/ marine/ animal oil of iodine value < 100, PEG, Sodium hexameta phosphate/ tripolyphosphate

Equipment

SS Reactor, Thermic fluid system

Organisation

Central Leather Research Institute, Chennai

Cross Reference

Organisation Page 146

Phosphorilated Fatliquor

DESCRIPTION

- Process involves interesterification of oils with polyethylene glycol, followed by phosphorilation and subsequent neutralization to pH 7.0 - 7.5

Advantages

- Environment friendly

Target Countries

- Developing countries

Applications

- Manufacturing washable leathers
- Manufacture of softy upper from cow/buffalo hides and goat skins

Current stage of development

In industrial use

Collaboration options

Open to all options

IPR details

Patents: Applied for

SPECIFICATIONS

Raw materials

Vegetable Oil, PEG, Orthophosphoric acid

Equipment

SS Reactor, Thermic Fluid System

Techno economics

Plant with a capacity of 1 ton per day requires investment of Rs 75 lakhs

Organisation

Central Leather Research Institute, Chennai

Cross Reference

Organisation Page 146

Sulphited Fatliquor

DESCRIPTION

- The process involves sulpho-oxidation of vegetable/marine oil in the presence of catalyst

Advantages

- Environment friendly

Target Countries

- Developing countries

Applications

- Manufacture of softy upper from cow/buffalo hides and goat skins

Current stage of development

In industrial use

Collaboration options

Open to all options

IPR details

Patents: Applied for

SPECIFICATIONS

Raw materials

Vegetable oil, marine oil, Sodium bisulfite

Techno economics

Plant with a capacity of 1 Ton per day requires investment of Rs 75 lakhs

Equipment

SS Reactor, Thermic Fluid System

Organisation

Central Leather Research Institute, Chennai

Cross Reference

Organisation Page 146

Acrylic Medium Soft Binder for Leather Finishing

DESCRIPTION

- The process involves co-polymerisation of Acrylic esters and Vinyl monomers in presence of catalysts in order to obtain a film of medium hardness and gloss on leather to be finished

Advantages

- Products improved functional properties
- Forms medium, hard and stretchy film on leather with good fastness properties. The film is resistant to ageing and light

Target Countries

- Developing countries

Applications

- Used in leather finishing formulation

Current stage of development

In industrial use

Collaboration options

Open to all options

IPR details

Patents: Applied for

SPECIFICATIONS

Raw materials

Acrylic ester, Acrylic monomer, emulsifier, catalyst

Techno economics

Plant with a capacity of 1 ton per day requires investment of Rs 200 lakhs

Equipment

Stainless steel reactor, stainless steel blenders, filter, pump, boiler, refrigeration system

Organisation

Central Leather Research Institute, Chennai

Cross Reference

Organisation Page 146

Acrylic Soft Binder for Leather Finishing

DESCRIPTION

- The process involves co-polymerisation of Acrylic esters and Vinyl monomers in presence of catalysts in order to obtain the required chain length and degree of polymerisation

Advantages

- Products improved functional properties
- Forms soft, adhering, stretchy film on leather with good fastness properties and cold crack as well as scuff resistance. The film is resistant to swelling
- The binder does not load the grain, thereby retaining the natural look and feel of leather

Target Countries

- Developing countries

Applications

- Used in leather finishing formulation especially for soft upper leathers

- Current stage of development**
In industrial use
- Collaboration options**
Open to all options
- IPR details**
Patents: Applied for

SPECIFICATIONS

Raw materials

Acrylic ester, Acrylic monomer, emulsifier, catalyst

Techno economics

Plant with a capacity of 1 Ton per day requires investment of Rs 200 lakhs

Equipment

Stainless steel reactor, stainless steel blenders, filter, pump, boiler, refrigeration system

Organisation

Central Leather Research Institute, Chennai

Cross Reference

Organisation Page 146

Electrical Insulation Coating

DESCRIPTION

- One component, ready to use system
- High electric strength:- 55 kV/mm
- Excellent resistance to moisture
- Resistance to acids, alkalis & chemicals
- Good abrasion and scratch resistance
- Thermally stable upto 200°C
- Quick drying at room temperature

Advantages

- Simple application by brush or spray technique
- Single handed operation, no skilled manpower
- No special surface treatment before application
- Application on surfaces having any geometry
- Cost effective as compared to conventional methods

Target Countries

- Developing countries

Applications

- Electrical equipments where phase to phase/phase to earth clearances are critical
- To form insulated bus-bar systems
- For indoor as well as outdoor installations to avoid flashovers due to vermin or moisture entry
- To reduce the leakage current through the body of outdoor as well as indoor installations

- Current stage of development**
In industrial use
- Collaboration options**
Open to all options
- IPR details**
Patents: Applied for

SPECIFICATIONS

Function

Single component, air drying, Insulation coating for electrical & electronic industries

Chemical Composition

Thermoplastic copolymer

Colour

Red, Yellow, Blue, Clear

Electric Strength

55 kV/mm

Thermally Stable

Upto 200°C

Organisation

SK Formulations

Cross Reference

Organisation Page 171

Aerosol Formulation

DESCRIPTION

- Aerosol formulation of industrial aerosols such as cleaners, rust preventives, protective coatings, mould release agents, conformal coatings for PCB etc.
- The company is ISO 9002 certified
- Approved by BTTG OEKO TEX, C-dot (Department of Telematics), CACT and are conforming to US military specification
- Recommended by MAYER, VOLTAS, TERROT, BATLIBOI, Bajaj, Mahindra, Telco, Exide, Fiat etc

Advantages

- Environmental friendly
- Saves time
- Saves energy & money
- Instant maintenance
- Efficient results
- Prolonged equipment life and reduced breakdown in the industry

Target Countries

- Developing countries
- Middle east
- South Asian countries

Applications

- Textile industry
- Automobile engineering
- Electrical & electronic industries
- Shipping
- Defence
- Railways

- **Current stage of development**
In industrial use
- **Collaboration options**
Joint venture, Royalty

Organisation

Chemverse Consultants (India) Pvt. Ltd.

Cross Reference

Organisation Page 149

Cyanoacrylate Adhesives

DESCRIPTION

- Condensation polymerization of an ester of cyanoacetic acid with an aldehyde and later modification in anhydrous atmosphere
- An over all product yield of the order of 80-85% with the purity of 95-99%
- Normal effluent treatment measures are sufficient

Advantages

- Estimated investment for a battery limit plant of 1 TPD is around USD 0.08 million

Target Countries

- African countries
- China
- South American countries

Applications

- Methyl and ethyl cyanoacrylate adhesives are used for bonding metals, plastics, rubbers, glass etc.
- Bonding aircraft interior parts, in calculators & computer assembly, medical equipments, optical lenses, etc.

- **Current stage of development**
Process standardised at bench level 1kg/batch. Four licensees
- **Collaboration options**
Process know-how

SPECIFICATIONS

Raw materials

Esters cyanoacetic acid
Aldehyde
Phosphorous pentaoxide
Phosphoric acid
Anionic and free radical inhibitors

Equipment

Reactors and other simple equipment

Organisation

Indian Institute of Chemical Technology

Cross Reference

Organisation Page 159