

“INSPIRATION ACTS AS A CATALYST FOR SUCCESS.” - Sam Veda

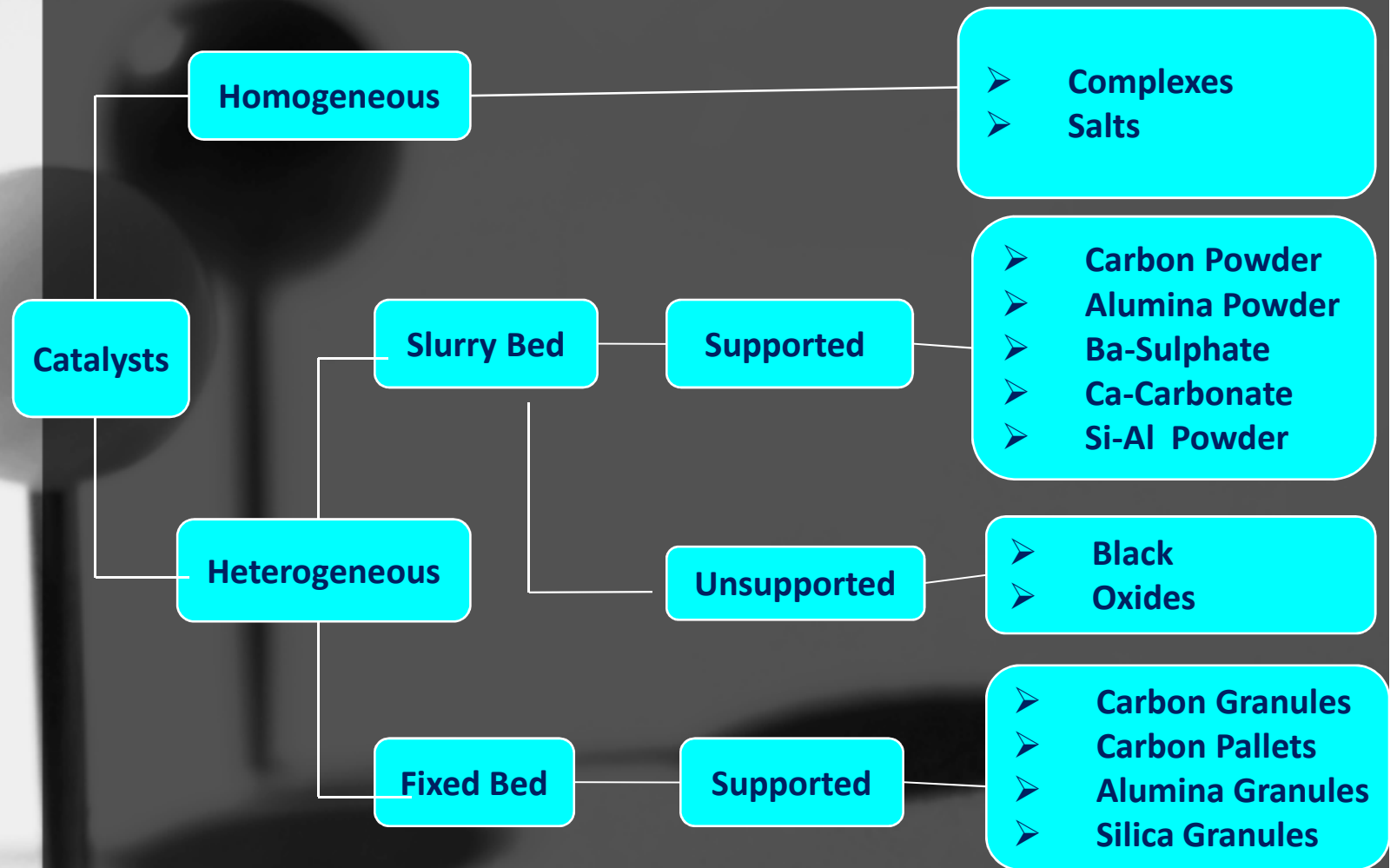
Monarch Catalyst Private Limited

MONARCH
CATALYST FOR GROWTH



An Overview on
Noble Metal Catalyst & Chemicals
NMC®

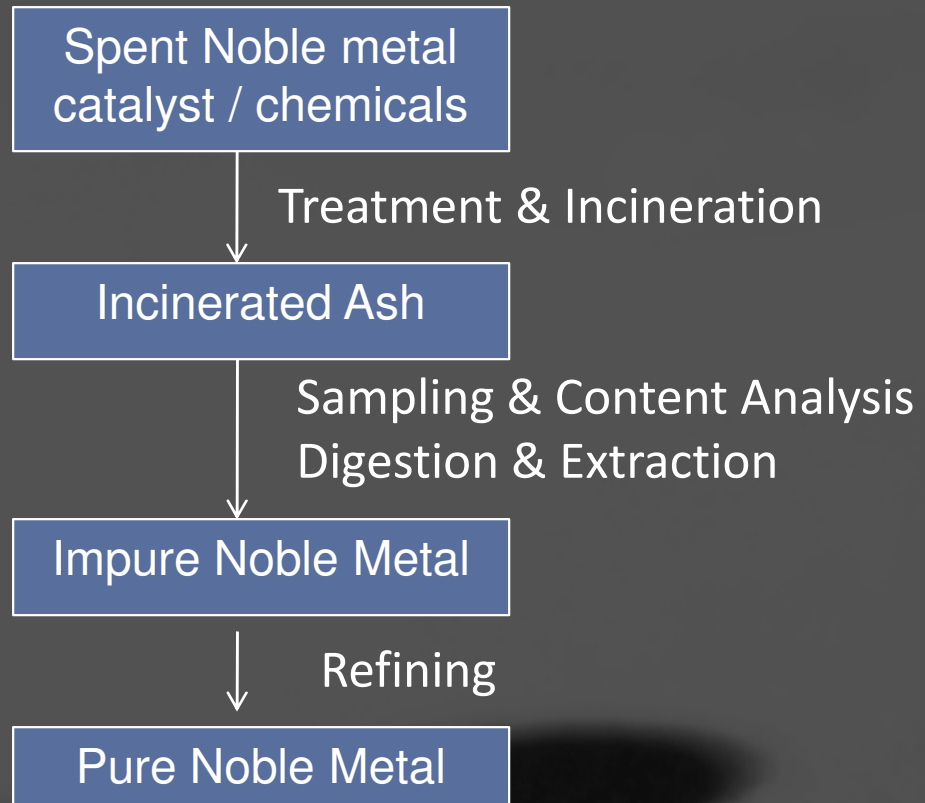
Noble Metal Catalyst & Chemicals



NMC Catalyst Grades

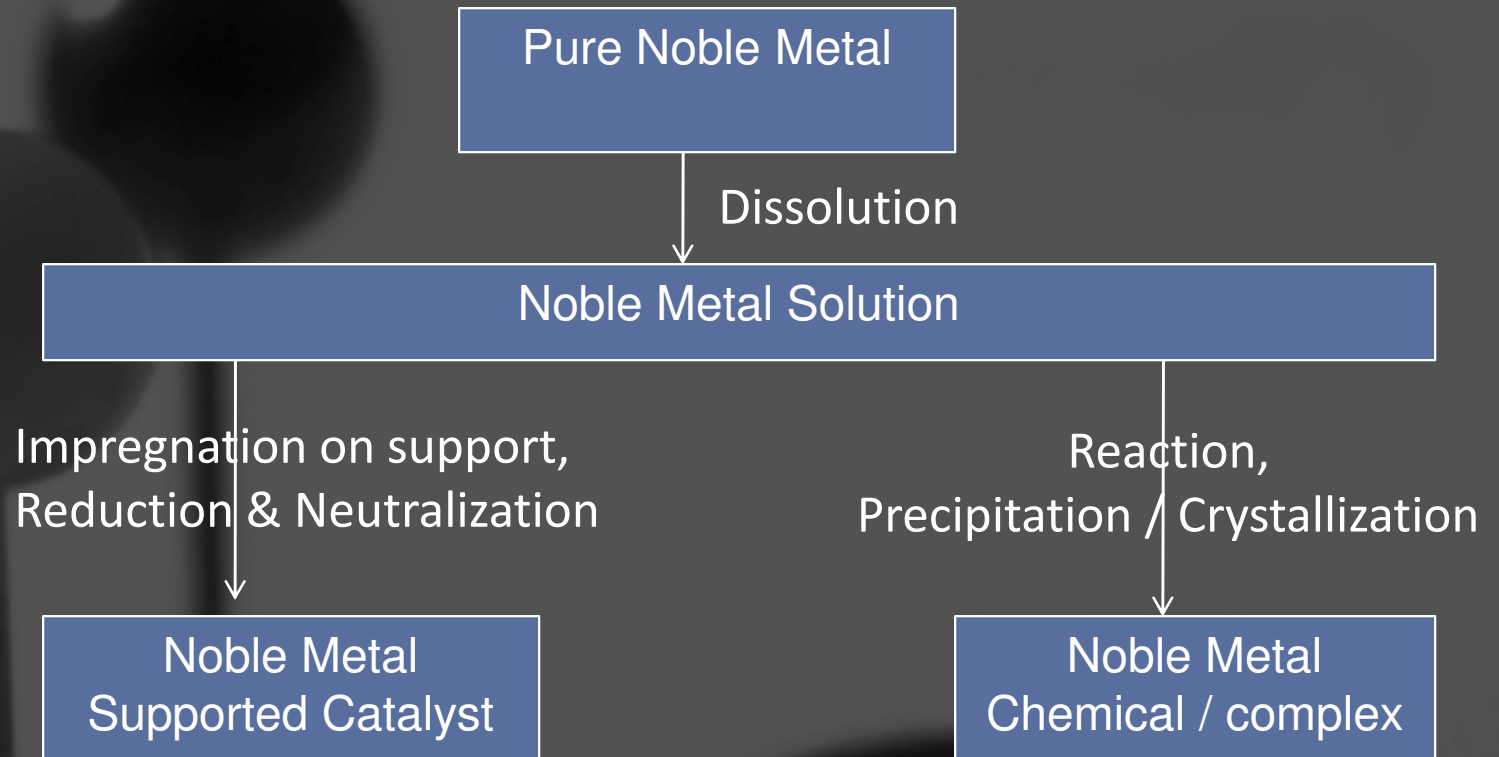
- Catalyst can be customized with different metals like Palladium, Platinum, Ruthenium & Rhodium and with different Metal Loading ranging from 1% to 20%.
- Unique characteristics
 - Supports like Activated Carbon, Alumina, Calcium Carbonate, Barium Sulphate
 - Surface Area, Pore size, Pore volume
 - Activity & Selectivity
- Every grade is designed based on the applications.
- Specifically designed to reduce different functional groups.

Manufacturing of Supported Catalyst



Cont'd...

Manufacturing of Supported Catalyst, cont'd.



Supports - Characteristics

Surface Area

Catalyst's Activity



Activated Carbon
800-1000m²/gm



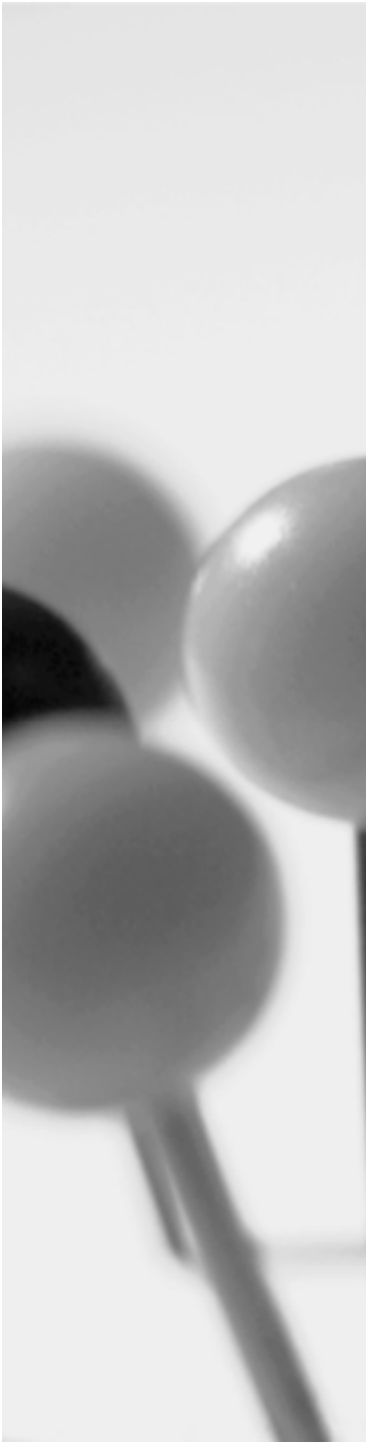
Activated Alumina
200-250m²/gm



Calcium Carbonate
Less than 10m²/gm



Barium Sulphate
Less than 10m²/gm



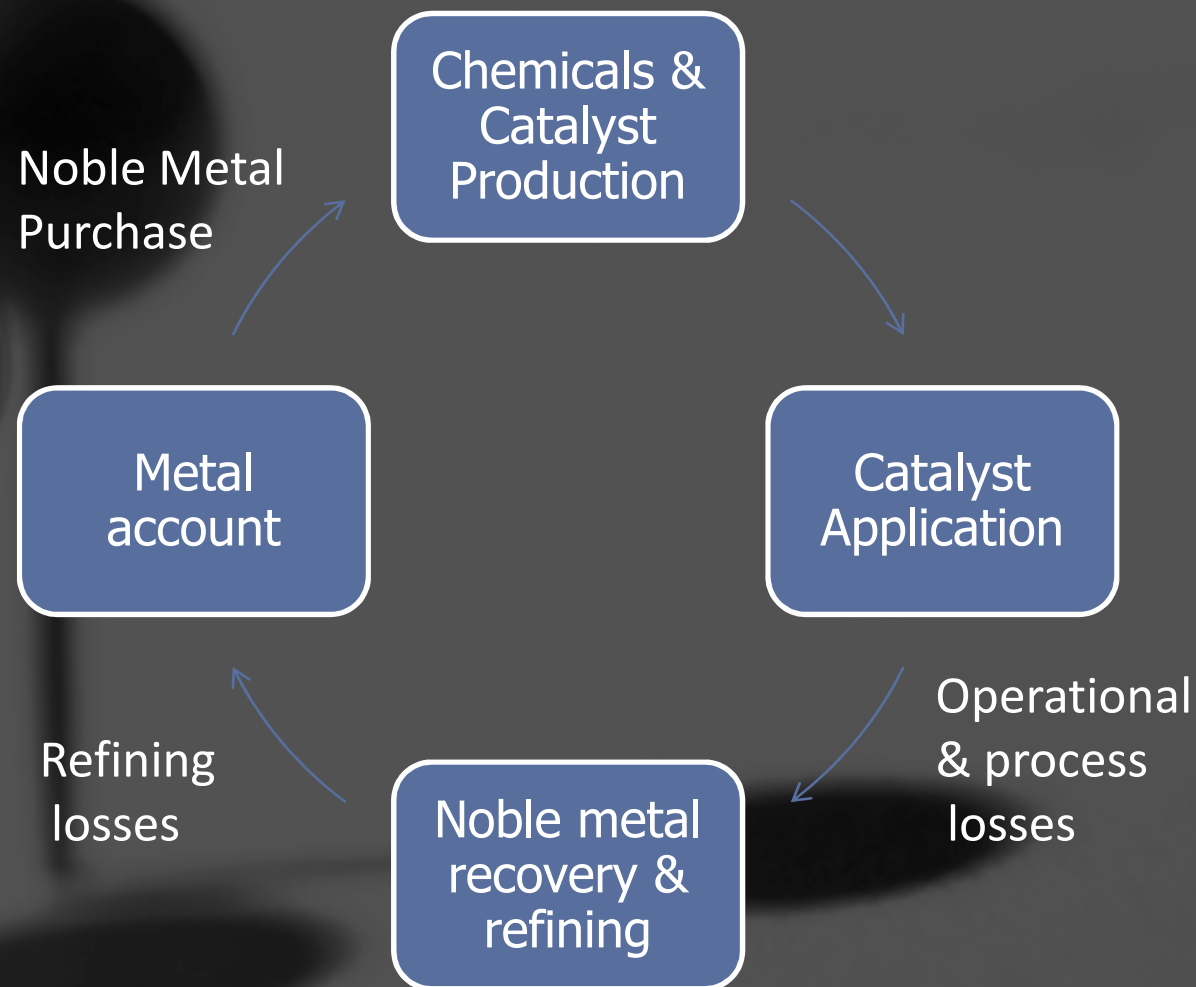
Advantages – Noble Metal Catalyst

- Higher Selectivity - hence, higher Yields.
- Higher Activity.
- Faster Filtration Rates.
- Higher Re-cycles.
- High Recoveries leads to Cost Effectiveness.

Noble Metal Catalyst - Applications

- Ring Hydrogenation of Aromatic Compounds,
- Reduction Of Carbonyl Compounds,
- Reduction of Nitro & Nitroso Compounds,
- Reductive Alkylation & Amination,
- Reduction of Nitriles,
- Dehydrogenations / Deprotection,
- Hydrogenolyses.....

Noble Metal Catalyst - Cycle



Operational & Process Losses

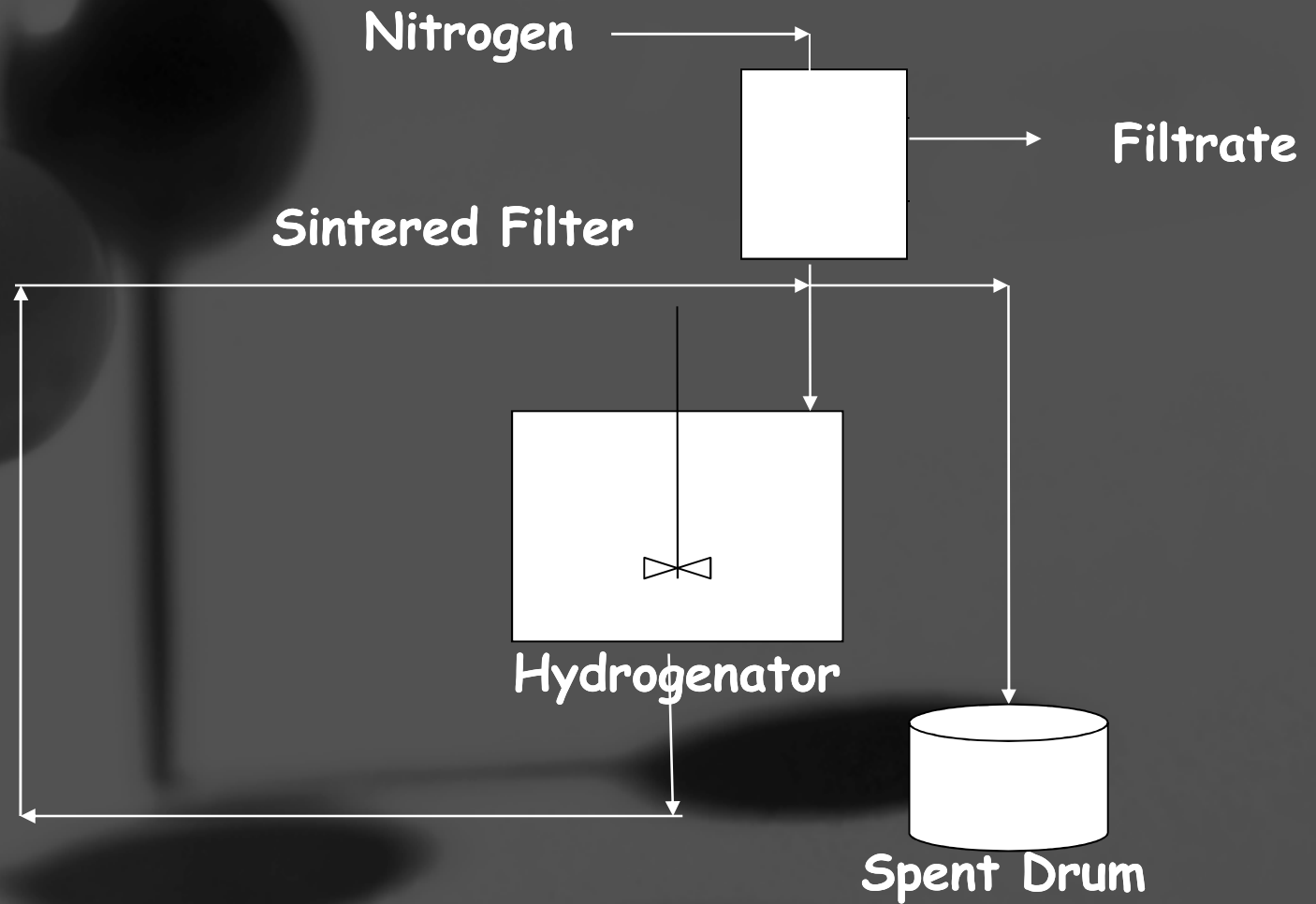
Handling :

- Ensure minimum handling of catalyst
- while charging in the reactor &
- Discharging & Collection of Catalyst from Filter

Filtration :

- Preferably a closed system, where the catalyst can be back-washed into the reactor for next reaction, e.g. Sintered Metal Candle Filters.

Ideal Filtration Flow Diagram & Video



Useful Catalyst Handling Tips

- Preferably use Wet Catalyst for safety reasons (dust formation) and for reduction of catalyst losses.
- For dry catalyst, prepare slurry by slowly adding Catalyst to Water or suitable solvents. *Suitable Solvents should be used very carefully. If Methanol/Ether are the solvents the same should be chilled before making catalyst slurry and under Nitrogen atmosphere.*
- Catalyst should be ideally charged at a specific temperature e.g. 40°C
- Always ensure that the reaction mass is a clear solution before catalyst charging

Hydrogenation Safety Tips

- Catalyst & H₂ handling needs to be addressed together.
- Understand thermo chemistry – heat of reaction, possible run away, impurity effects, decomposition, unstable intermediates etc.
- Employ engineering & environmental controls – probes, alarms etc.
- Check & ensure the reactor is clean & purged with Nitrogen
- Check all the pressure regulators, valves etc are leak proof
- Inspect & test the vent & lines to prevent fouling & plugging of vent & accumulation of pyrophoric
- Plan, train & communicate adequately

Safety & Storage

- Always use safety apparels.
- Always store in cool & shaded place, away from solvent & acid fumes.
- Ensure that the material remains in sealed condition after removal of part catalyst.
- Always keep the fire extinguisher near the catalyst handling area.

Safety & Storage

- Ensure complete removal of organics from Spent catalyst by washing with water
- Never allow the used catalyst to DRY.
- Spent catalyst should be stored in separate demarcated area (avoid use of paper or corrugated boxes for storage) and labeled with details including input details.
- Ensure the spent catalyst drums are properly labeled & sealed while transportation.

Factors affecting catalyst performance

- Poisoning:
 - Free Sulphur & Chlorine, Amines, Inorganic salts, Acidic & Ammonical fumes
- Operational
 - Poor gas distribution & mixing of reactants.
 - Leakages in the system

Analysis Methods

- ✓ Noble Metal Content in Fresh & spent catalysts.
- ✓ Hydrogenation Test (Autoclave –Performance Test)
 - Each grade tested on Std reducible molecule.
 - Always maintain std Catalyst & Std RM.
 - Strongly recommend for performance of user test (for desired molecule).
 - The above user test confirms the quality of catalyst as well as the raw materials.

Technical Services

- At **MONARCH**, our customers are our strategic partners, right from their R&D stage to scaling up, initially at pilot and later on the plant level.
- We also work closely with our customers to achieve consistent and more than 92-96% recoveries wrt inputs.

Our Offer

- **MONARCH** is confident to offer an improved solution to all catalyst needs.....
 - Be at par with Global standards and maintain consistency in quality.
 - Efficient deliveries
 - Derive the best results with Excellent technical support.
 - Development of Catalyst for new and emerging applications

CONTACT PERSONS:

Pradip Hosangadi
Sr. Manager- NMC Business
pradip@monarchcatalyst.com
+91 9820160804

Prasad Rane
Asst. Manager- NMC Business
prasad@monarchcatalyst.com
+91 99833538220

Vikas Baing
Asst. Manager – NMC Business
vikas@monarchcatalyst.com
+91 9819685696

Jayant Manjeshwar
G M – Technical Manager
jayant@monarchcatalyst.com
+91 9930006467

Usha Kumar
Asst. Manager- NMC Business
usha@monarchcatalyst.com
+91 9920894763

Lets' work Towards...



...A Symbiotic Future

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