"INSPIRATION ACTS AS A CATALYST FOR SUCCESS." - Sam Veda

Monarch Catalyst Private Limited

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CATALYST FOR GROWTH


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An Overview on
Activated Alloy Catalyst KALCAT®
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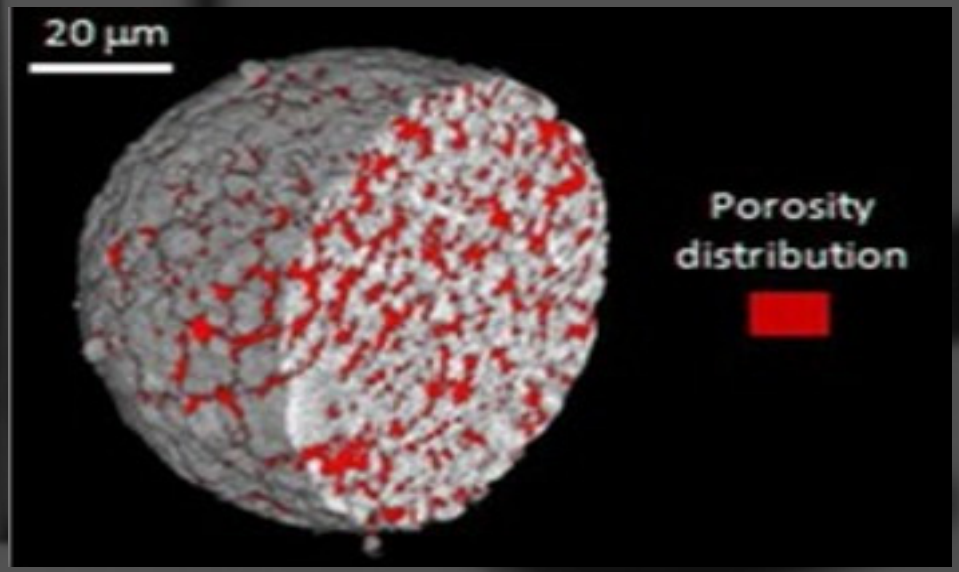
Activated Alloy Catalyst

- Raney Nickel catalyst was discovered in 1924 by Dr.Murray Raney (1885-1966)
- Activated Alloy Catalyst are fine particles of Nickel seated on Aluminum, suspended in water.
- This catalyst is porous with occluded hydrogen in its pores, which imparts activity.



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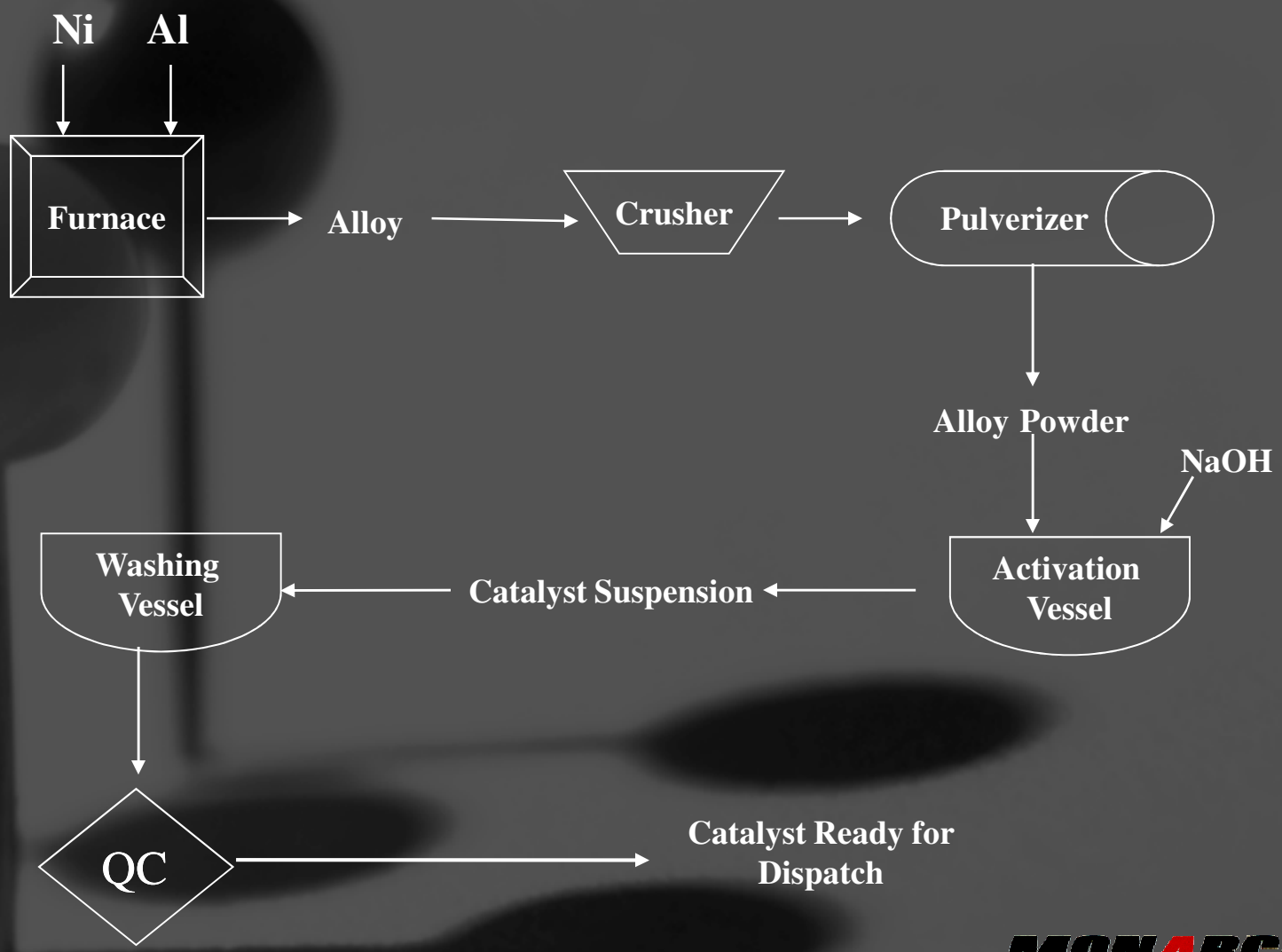
Manufacturing Process



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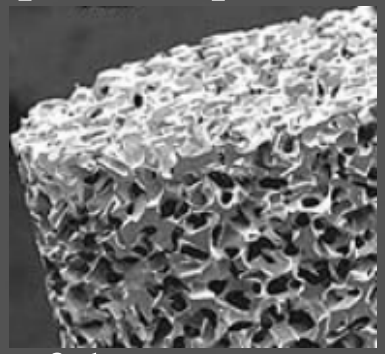
Activation & Structure

Activation Reaction

$$2Al + 2NaOH + 6H_2O \rightarrow 2Na[Al(OH)_4] + 3H_2$$

- Leaching of Aluminium by Alkali, makes alloy particles porous and imparts activity to the catalyst.



Structure of the Catalyst

- Catalyst particle consists of Ni seated on Al.
- Al works as support & preserves pore structure of the catalyst.
- Particle is porous & H_2 is occluded in it.
- Average particle size is 20 - 25 microns.

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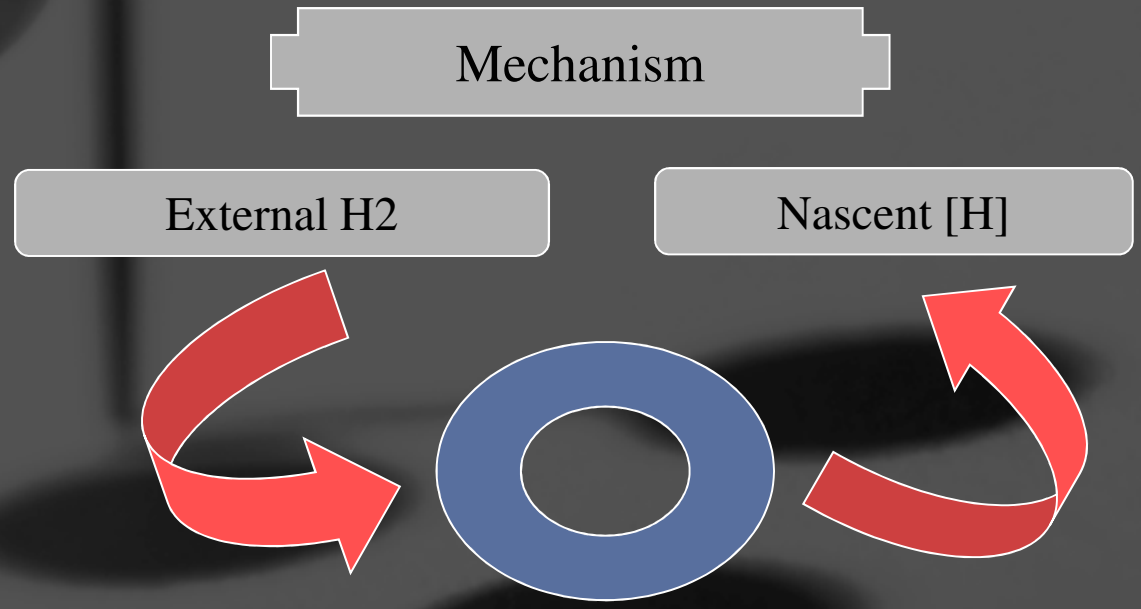
Mechanism of reaction

- Replacement of occluded H_2 by External H_2 (this is very important to keep the catalyst active).
- Diffusion of reactants to the Catalyst Surface.
- Adsorption, reaction with elemental H & de-sorption of product.



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Essential Catalyst Properties

- Activity: Rate at which the catalyst hydrogenates the feedstock to product. E.g Percentage change in reactant (conversion)
- Selectivity: Ability of the catalyst to give the desired product, out of all possible products, e.g. product as percentage of reactant (yield)
- Shelf Life: Time for which the catalyst keeps a sufficient level of activity and/or selectivity.

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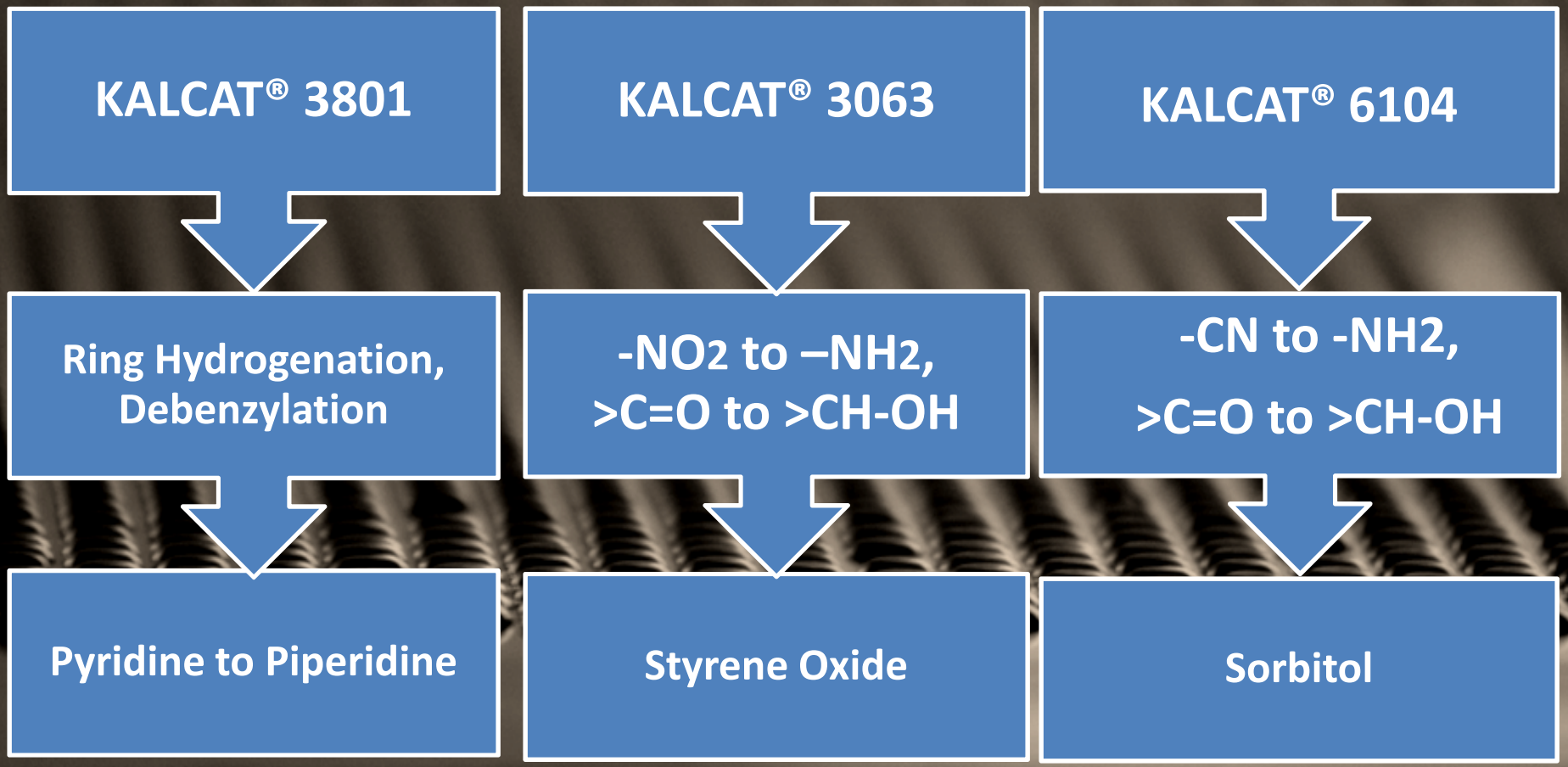
Applications

KALCAT® 1961 Ni% 85-89	KALCAT® 2921 Ni% 87-91	KALCAT® 4061 Ni% 85-89	KALCAT® 9031 Ni% 85-89
-N02 to –NH2 With min dehalogenatio, Oximes to Amines	-NO2 to –NH2 in neat condition	-CN to -CH2-NH2	Dehydrogenation
Lisinopril, Mebevarine,	PNC to P-cumidiene	Venlafaxine, Atorvastatin	Carbazole

Applications



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Testing Methods

- **Weighing of Catalyst**
- **Hydrogen Absorption Test**
- **Hydrogenation test**

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Weighing of catalyst

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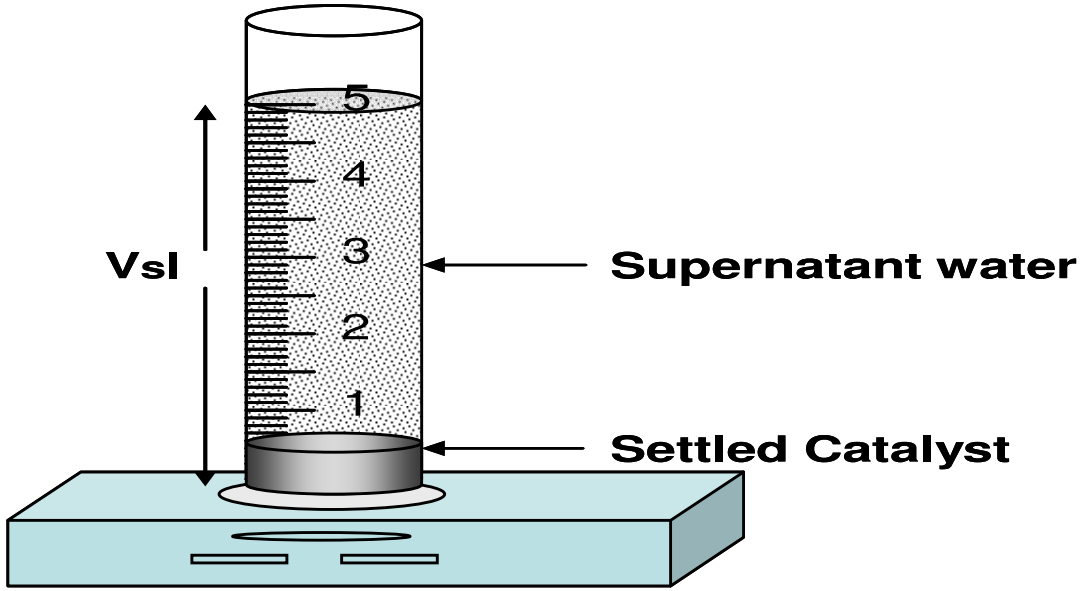
$$W_{cat} = 1.22 (W_{sl} - V_{sl})$$



Wsl (weight of catalyst + weight of water)

- Very important step: to measure accurate dosage of catalyst.
- Derived from densities to metals and Archimedes principle.
- Videos for AAC presentation\Lab weighment.mpg
- Videos for AAC presentation\RNC weighment.mpg

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Hydrogen Absorption Test

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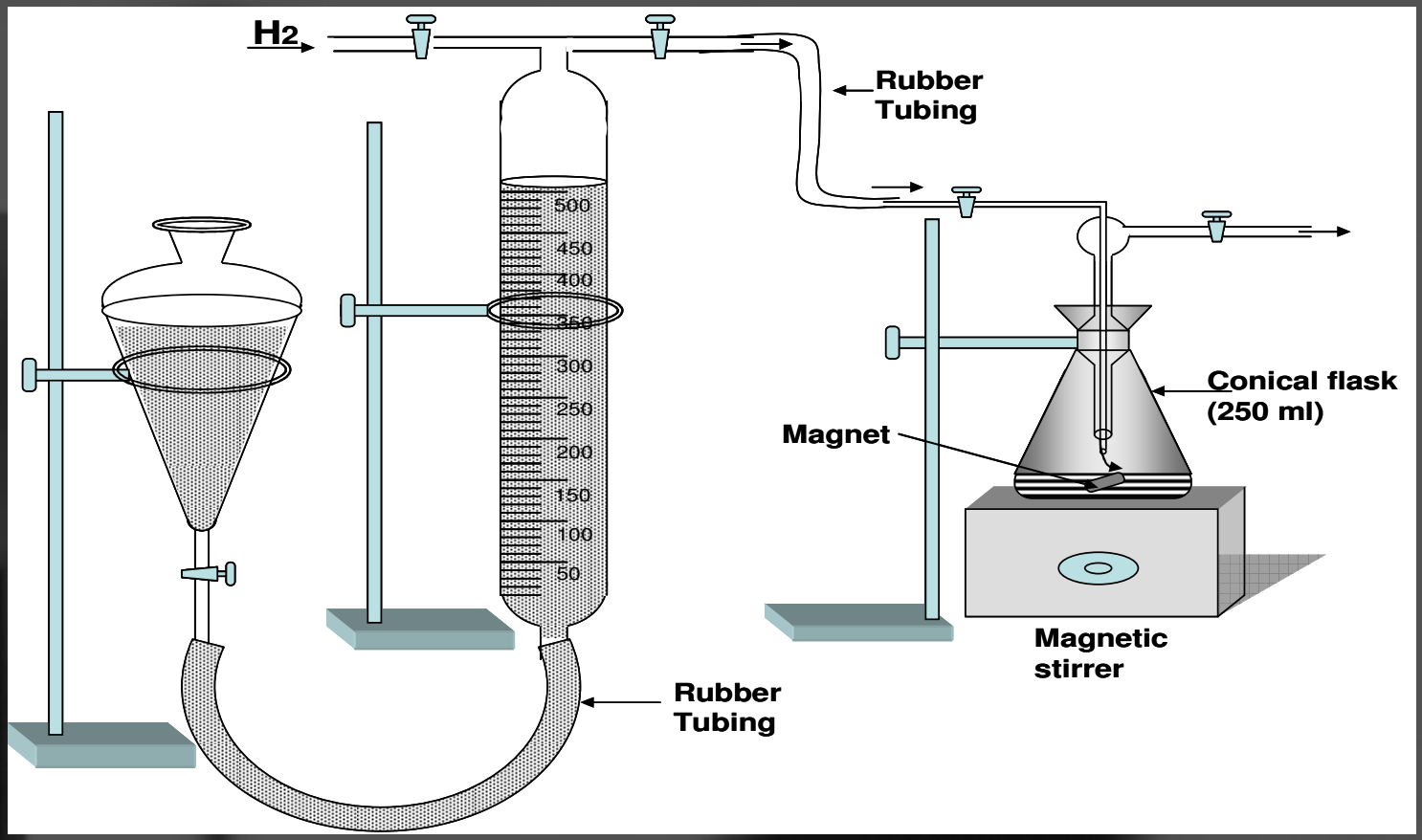

- Gives primary idea about the catalyst activity.
- This test confirms the desired levels of catalyst activity.
- Useful in establishing recycles with the catalyst.
- Videos for AAC presentation\NB Activity.mpg

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Hydrogenation (Autoclave) Test

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- This test confirms the quality of catalyst as well as the raw material
- Each grade is tested at MCPL different molecules for different grades.
- Always maintain Std Catalyst & Std RM.
- Highly recommended to perform this test at customers end on their own molecule – ‘USER TEST’.

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Handling Tips

- Weigh the Catalyst by “DRY basis formula”.
- Restrict excessive washings to avoid loss of activity.
- Gentle handling to avoid catalyst attrition
- Charge catalyst by Gravity (not by suction) & retain the catalyst activity.
- Keep stirrer ‘OFF’ till you start reduction.
- Maintain Specific temp (e.g. 40^0C) of reaction mass during catalyst charging.
- Always make sure that the “*solution for hydrogenation is homogeneous*”

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Factors affecting catalyst performance

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- Poisoning:

→ Gelatinous $Al(OH)_3$ present in catalyst,

→ free ions of Sulphate, Nitrates, Carbonates, Acids & high concentrations of Alkali,

→ oxidation & removal of occluded H_2 during the handling & dosing of catalyst.

- Technical Errors

→ Poor gas distribution.

→ Poor mixing of reactants.

→ Leakage in gas supply

- Breakage or Erosion of catalyst particles (Attrition)

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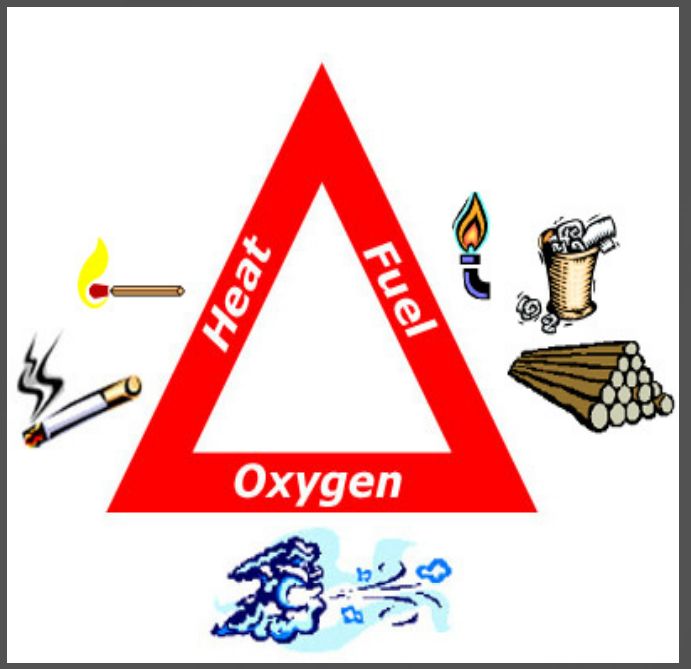
Safety Tips



- Do not allow catalyst to dry.
- Always store under water.
- Always use safety Apparels.
- Avoid skin contact.
- Keep drums upright & store in good air ventilation.
- Spent catalyst should ALSO be carefully stored under water.

"Commit your blunders on a small scale and make your profits on large scale"

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Reprocessing – *A Myth*

- Catalyst is an Alloy Particle
- During reaction “ATTRITION” occurs
- Oxidation of Catalyst.
- Coating of Organic Material.
- Catalyst Particle can not be reconstructed to its original state.
- *Technically AAC cannot be reprocessed*

* * *

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Spent Ni catalyst

- We offer ***BUY BACK*** at very attractive price
- Nickel extracted from the Spent in salt form
- Assurance on total re-cycle of the nickel
- Environmentally sound processes
- *Approved & Certified by* ***CPCB & MPCB*** for *Processing and recycling of Hazardous Waste.*

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KALCAT® - Advantages

- Product adhering to ***"International quality standards".***
- Specific Grades designed based on application.
- We use Virgin Nickel metal - the secret of "consistent quality"
- Value added services –

→Catalysts Screening Service

→ Process Optimization

→ Process Trouble Shooting

→ Tailored Catalysts

→ Technical Training Seminars

→ Ni recovery from spent catalysts

- We offer complete Cycle

"We sell & We buy back"

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Technical Services

- At ***MONARCH***, we always work with our customers as strategic partners, right from R&D to scaling up.
- We have a well equipped laboratory with all the essential elements related to hydrogenation. Bank of application studies, 5 autoclaves with efficient filteration systems, Gas Chromatography, HPLC, TLC and wet lab.
- We accept projects of hydrogenation where selection of catalyst, optimization studies for better cost economics are carried out.

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Our Offer

- We are confident that we can offer you an improved solution to your catalyst needs……

  - Be at par with Global standards and maintain consistency in quality.
  - Efficient deliveries
  - Derive the best results with our Excellent technical support.
  - Catalyst development at our research centre for new and emerging applications

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Lets' work Towards...

…A Symbiotic Future

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