# Value Added Products from Gasification Activated Carbon

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- Activated carbon has the strongest physical adsorption forces or th highest volume of adsorbing porosity of any material known to man.
- > Very high surface area 500 1500 m2/g.
- > Highly porous structure Consists of micro-pores and macro-pores.

# Properties

- Surface area
  - Determines the adsorption capacity.
  - Usually found by the adsorption of nitrogen.
  - o Depends on the micro-pores
- > Physical properties density, hardness, particle size

# Other Indicators to Adsorbing Properties

- Iodine number —Adsorption of iodine from solution.
  - Represented as milligram of iodine adsorbed per gram of carbon
  - The iodine number is nearly equal to the surface area in m2/g
- Decolorizing Power
  - Adsorption of dyes from solution –Methylene blue number
- Adsorption capacity —adsorption of organic vapors from air stream
  - o Carbon tetra chloride

- o Benzene
- > Oil retention and filterability
- Hardness number —Percentage retained in a sieve of given mesh size after shaking the material along with steel balls for a specific time.

#### Source

- Biomass Wood, coconut shell, etc
- > Charcoal made thermally driving away volatiles
- > Charcoal activated by steam or by acid wash

## Byproduct from Gasification

- With coconut or wood chips as feed stock, activated charcoal can be extracted from the reactor at varying rates.
- > The yield of charcoal range from 4 % to 20%
- Iodine number obtained range from 200 800. Larger iodine number obtained with lower yield.
- > Charcoal can be further activated with steam or nitrogen

## Advantages of obtaining Activated carbon from gasifier

- > Utilization of energy of volatiles
- High quality charcoal
- Environment friendly. Does not produce pollutants as in the conventional process.
- > Improves the economics of gasifier operation.
- > Control over the quality of char generated.

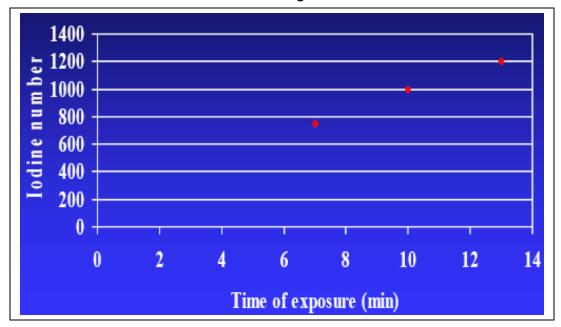
#### Steam Activation of Charcoal

- > Pass steam the a bed of charcoal at 600-800C for 8 12 minutes
- Micro pores are opened by reaction of steam with carbon

- Indine number increases with time initially, but decreases subsequently due to coalition of micro pores
- > Carbon is consumed because of reaction of H<sub>2</sub>O with carbon
- Iodine number in excess of 1000 can be obtained

#### **Activation using Inert Gases**

- Activation can be achieved by exposing carbon to inert gases at high temperature.
- > Loss of carbon during the activation is negligible
- > No tendency for reduction in iodine number with time of exposure
- > Further work in progress for activation with combustion products.



#### lodine number obtained with nitrogen at 850° C