

## **BEST OF SUBJECT CATEGORY AWARD CHEMISTRY – MUMBAI NATIONAL FAIR**

Biomass An Aid In Metallurgy  
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Coke, a byproduct of coal, is used in the conventional smelting of ores. But it causes many difficulties due to its non-uniform availability on earth and the pollution problem it poses. Biomass, being a non-pollutant organic material, can be used as an alternative to coke in the smelting of ores.

The biomass was partially burnt in a biomass gasifier consisting of a reactor with a thin charcoal bed needed for the burning. Holes in the reactor were made in the sides so that the pollution could be minimized. The air was passed through these holes to assist the burning. The biogas obtained after the burning was passed into a tube linking a small furnace that was intended for the smelting of the molten ore after the slag removal. (Iron ore in this case was experimented with). An outlet tube from the top of the furnace was connected back to the inlet tube containing the biogas thus forming a heat exchanger. This unique attachment not only maintained the heat required in the furnace (~1000 C) but also prevented whatever little atmospheric pollution that could have been caused during the smelting process.

The biogas obtained from the gasifier was found to contain carbon monoxide, hydrogen and a negligible amount of nitrogenous matter that wouldn't involve itself in the smelting. The ferric oxide in the furnace reacted with carbon monoxide and hydrogen and finally pig Iron was obtained. Carbon dioxide and water were liberated.

Biomass is readily available, cheaper and more efficient than coal in smelting of ores. It is a non-toxic material and can easily be handled by people. Thus, using biomass in metallurgy can employ many people and create a better economic setup for India.