

## COMBUSTION CHEMISTRY

As you are aware, above problem is reduced the life and performance of boiler. For better performance of boiler following two parameters need to be improved.

- Combustion Efficiency
- Thermal Resistance of Heat Transfer Surfaces

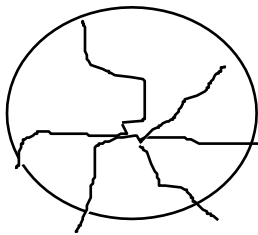
Combustion efficiency is governed by fuel quality (Ash contents, Carbon, Moisture, C.V.), excess air ratio, bed height, particle size, air velocity, furnace configuration and complete oxidation of carbon. The thermal resistance of heat transfer surfaces depends on tube material, waterside scaling, fireside fouling, particle morphology, presence of volatile and temperature gradients. The combustion efficiency can be improved by using suitable combustion catalyst. The improved combustion will not only improve the overall efficiency but also reduce the emission level of the system. The additive also alters the particle morphology, which reduces the fouling and clinkering tendency of ash by changing the eutectic structure of ash and thus the thermal efficiency is improved.

"CMC" 95 Series of Combustion Monitoring Chemical (CMC)<sup>®</sup> – Basic Reactions

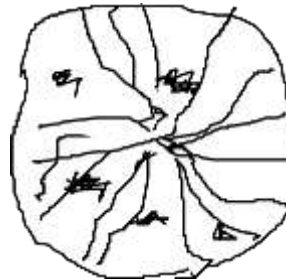
A. Catalytic action of "CMC" 95 Series.

1. Provides better surface area:

The hetero organic catalyst in "CMC" 95 Series provides better pore surface area by penetrating into fuel particles



Normal fuel particle



Advanced Catalysed fuel particle

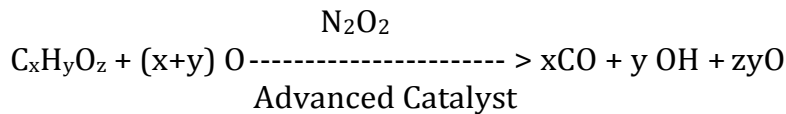
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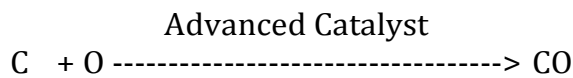
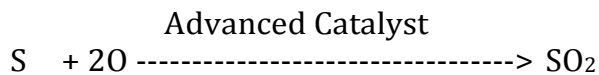
## 2. Improves Catalyzed Penetrations:

"CMC" 95 Series provides high rate of oxygen penetration along with enhanced surface area obtained through advanced catalyst. It also provides ionic oxygen. The catalyzed reaction with ionic oxygen may be represented as:

### I. Volatile Combustion



### II. Gas – Solid Reaction



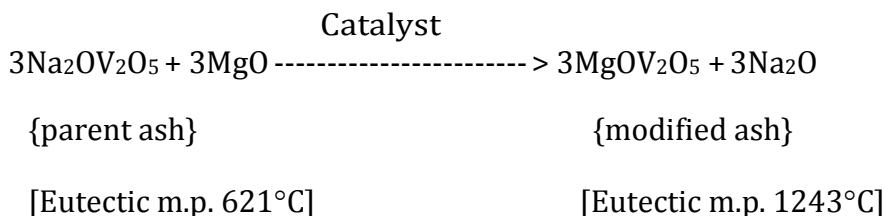
## B. Anti-Fouling Action of "CMC" 95 Series

The following routes obtain anti-fouling effect: -

- By changing preferred direction of orientation of particles.
- By forming a protective layer of vapours on surfaces.
- By retarding ash reaction leading to formation of Sodium and Potassium Sulphates and Polysulphates.

Mg(OH)<sub>2</sub> vapours has high affinity towards SO<sub>3</sub> & they form Magnesium Sulfates which has much higher melting points than that of Sodium and Potassium Sulphates.

- By changing ash fusion temperature through changing the eutectic structure of ash.



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CMC™

Per Mole™

CIN: U24299GJ2004PTC044442

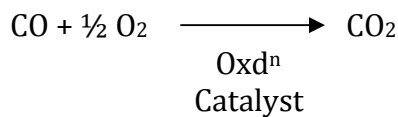
The fouling tendency of fuel can be judged from ash analysis by calculating a fouling factor as under:

$$\text{Fouling factor} = \frac{[\text{Fe}_2\text{O}_3 + \text{CaO} + \text{MgO} + \text{K}_2\text{O}] \times \text{Na}_2\text{O}}{\text{SiO}_2 + \text{Al}_2\text{O}_3 + \text{TiO}_2}$$

(All the constituents are in %)

## C. Anti-Emission Characteristics of "ALTRET" 95 SCA

### I. Control of CO



### II. Control of NO<sub>x</sub>



Thus the Combustion Monitoring Chemical "CMC" 95 Series helps in improving the boiler efficiency by the better combustion and cleaner heat transfer surfaces, resulting in reduction in specific fuel consumption and unwanted EMISSION Levels.

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