With Compliments from …

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CHINCO COAL CATALYST

Chinco improves combustion of coal by acting as a catalyst that lowers the reaction time thus reducing the ignition temperature to enable lower activation/ignition temperature.
Reduction in smoke, particulates and smut, tars and hydrocarbons that would previously evaporate (wet) at lower temperature (before actual ignition) and then leave via the stack, or sticking to the boiler tubes, are now combusted/ burnt due to the lower ignition temperature created by the catalyst. This creates new additional fuel/heat when burnt, instead of escaping through the stack as particulates and soot. Carbon in ash is reduced by 20% and more!

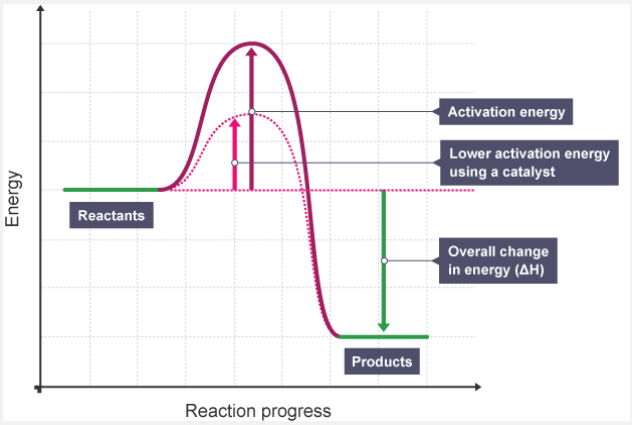
Chinco reduces coal consumption by at least 3%
The additional heat obtained by normally unutilized /unburnt soot and hydrocarbons now actually burning due to the catalytic reaction, improves the total heat generation and improved steam to coal ratio.

Chinco creates soft and friable build-up and not the hard carbon build-up on the steam tubes and interior of the boiler due to wet sticky tars and hydrocarbons that only evaporate and not burn-out at the lower temperatures. This hard build-up causes constant shuts of the boiler to chip and clean off hard build-up. Now the soft buildup creates much longer service times and easier cleaning of the tubes eventually.

Chinco reduces nitrogen- NOx and sulphur SOx compounds
The sulphur and phosphor impurities are removed from the exhaust gasses to form complex sulfates in the ash instead of the dangerous chemicals escaping through the smoke stack.

Chinco reduces greenhouse gas emissions such as carbon monoxide CO, particulates, soot/char, and complete combustion takes place.

CITATIONS/REFERENCES REGARDING COAL CATALYSTS!



https://www.researchgate.net/publication/257643581

*By means of thermogravi-metric analysis, the catalytic effect of metallic oxides in the combustion behavior of coal was investigated under non isothermal conditions. Experiments were conducted from ambient temperature to 1000 °C at a heating rate of 20 °C·min^{-1}. The ignition temperature, burnout performance, and exothermic behavior were used to evaluate the catalytic effect. Moreover, the kinetics parameters (activation energy and pre-exponential factor) were determined using the Coats–Redfern method. It is indicated that, compared with the combustion characteristics of coal, the **ignition temperature** of the samples with metallic oxides **decreases** by 8–50 °C. Metallic oxides can **speed up the combustion rate** and burnout of the fixed carbon. The exothermic values of samples incorporating metallic oxides increase by 15–30%, which was due to the catalytic effect of metallic oxides on fixed carbon combustion. The **activation energies of the samples decrease,** and there is a linear connection between the activation energies and pre-exponential factors (ln A = 0.2683 × E- 12.807).*

https://www.researchgate.net/222851234 ...of all the kinds of the methods for intensifying combustion behavior, the **catalytic combustion** is an effectual one, which has been successfully applied in the power stations, cement industry and other civil utilization [20][21][22]. Catalytic combustion of pulverized coal has the following features:
(1) increases the combustion reactivity, due to a **reduction of the ignition temperature** and **increase of the combustion rate** [23,24],
(2) improves combustion efficiency by **decreasing the unburnt carbon in ash** and promoting the heat release [25], and
(3**) reduces the pollutants** in the exhaust gas, such as NO x , SO 2 , CO and PM [26][27][28]. Catalytic combustion of pulverized coal has been extensively studied in recent years,

www.researchgate.net/publication/257210436:
*Catalysts have been shown to enhance coal pyrolysis and char oxidation at **low to moderate** temperatures and heating rates (< 1250 K and 1–1000 K/s). Such catalytic activity has also been demonstrated at high heating rates and temperatures approaching pulverized coal combustion applications. The effect of an additive on coal pyrolysis and char combustion was studied in a flat-flame burner system at high particle heating rates using a Kentucky bituminous coal. Pyrolysis and char reactivity of two treated coals with different catalyst loadings were studied and compared with the untreated coal. The total volatiles yield for the treated coals increased between 14 and 18% (absolute) on a dry ash-free basis compared to the untreated coal in experiments conducted at 1300*

https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=6083348 Air pollution reduction Release of carbon monoxide, sulfur dioxide, and micro particles to the environment during coal combustion causes air pollution. In addition, the generation of carbon monoxide is an indicator of incomplete combustion. The concentration equivalents of carbon monoxide and oxygen in the exhaust gases with or without CC in Taixi coal clearly show that the addition of CC **significantly reduced the generation of carbon monoxide**, Fig. 3(a) . This is in agreement with the results in Fig. 2, where the larger peak areas with the additives implied the **more complete burning of the coal.** The oxygen level in the exhaust gas which can be used to monitor the burning process of coal in situ is shown in Fig. 3 (b) . for CC mixed with Taixi coal (1. 5%), the sharp increase in the oxygen level at about 750 °C indicates the early completion of the combustion process at that temperature, in comparison with about 850 °C without CC. (a) Carbon monoxide 1000 77 °C (b) Oxygen Fig. 3 Concentrations of carbon monoxide and oxygen in the exhaust gases of Taixi coal Sulfur-containing gases, such as SO2, are the main source of acid rain. CC agents were found to reduce the release of such gases by binding chemically with SO2, in addition to their ability to improve the combustion characteristics. The sulfur reduction ability of CCS agents was studied using a mixture of equal mass of Taixi coal and Yibin coal, containing 1.74% sulfur. The data in Table 3 illustrates the sulfur-removing effect of CC added to the coal mixture- More than half of the sulfur was removed when only 5% CC was added to the coal mixture. Table 3 Sulfur-removing effect of CC at 900 °C CCS content/% Sulfur removing (%) 1 28 2 36 3 42 4 48 5 52 T h e addition of CC agents to raw coal not only reduced the level of carbon monoxide in the exhaust gas, but also reduced the release of carbon micro particles to the environment, as evidenced by the **decreased blackness of the exhaust gas**. An example is shown in Fig. 4 for Taixi coal. The decreased soot actually results from the complete combustion with CC.

https://www.osti.gov/servlets/purl/826191
Certain catalysts have shown promise in reducing the amount of char nitrogen (nitrogen present in devolatized coal) under pyrolysis conditions. It is proposed that the **catalysts drive more of the nitrogen from the coal matrix** into the gas phase in heated environments where little or no oxygen O is present. This process could aid greatly in **reducing production of NOx emissions by converting the fuel nitrogen to harmless N_2 gas!**