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Introduction of SuperCoal™ Coal Enzymes

A biotech enzyme product for saving coal and reducing SO_x, NO_x, CO₂ emission and thermal pollution



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Introduction of SuperCoal™ Coal Enzymes

A biotech enzyme product for saving coal and reducing SO_x, NO_x, CO₂ emission and thermal pollution

[Summary]

SuperCoal™ Coal Enzymes is a biotech enzyme additive for coal which is 100% environment-friendly and available in liquid form for spraying application over coal, 72 hours before entering the combustion chamber.

After application of **SuperCoal™ Coal Enzymes**, it can increase energy usage by way of maximizing the explosion of coal's calories, reducing the demand of combustion air (20-30%), and improving boiler's heat exchange. To produce the same level of output as compared to not using **SuperCoal™ Coal Enzymes**, the amount of coal used is reduced, whilst also reducing SO_x, NO_x, CO₂ emission and thermal pollution.

The method of applying **SuperCoal™ Coal Enzymes** through direct spraying of the product on the coal ensures that it is thoroughly absorbed by the coal, which is unlike other products which uses chemical powder additives, which have a tendency to be discharged with ash and exhaust before completing the chemical reaction. Furthermore, the chemical powder additives usually only works under circumstances of high temperature and high pressure in the combustion chamber, and usually results in coal that has been unburned after the entire combustion process.

Spraying of **SuperCoal™ Coal Enzymes** on the coal can be done at the coal yard or storehouse, and it only requires 72 hours after application for the enzymes to take effect and completely refine the coal. The effects of the enzymes can last three to six months after its application.

SuperCoal™ Coal Enzymes can break down the moisture around and inside the coal (H₂O & coal) into H₂, O and CO ions. Both H₂ and CO are additional sources of combustible energy, which increases the burning quality of the coal and increases the temperature of the combustion process. The enzymes also generate up to three times more O ions around C ions inside of the coal as compared to non-application of the enzymes, which allows for burning of coal in the combustion chamber with less air supply (20-30% less). Thus **SuperCoal™ Coal Enzymes** can maximize the explosion of coal's calories, and reduce heat loss due to the cool air fed in the chamber and hot exhaust emitting to atmosphere.

SuperCoal™ Coal Enzymes can lower the ignition temperature of coal, catalysing the combustion of volatile matters including poly aromatic hydrocarbons, and it can catalyze the combustion of any unburned carbon on the combustion chamber, therefore improving the efficiency of the boiler's heat exchange.

Due to these factors, **SuperCoal™ Coal Enzymes** dramatically saves coal and reduces SO_x, NO_x, CO₂ emission and thermal pollution significantly.

[Advantages]

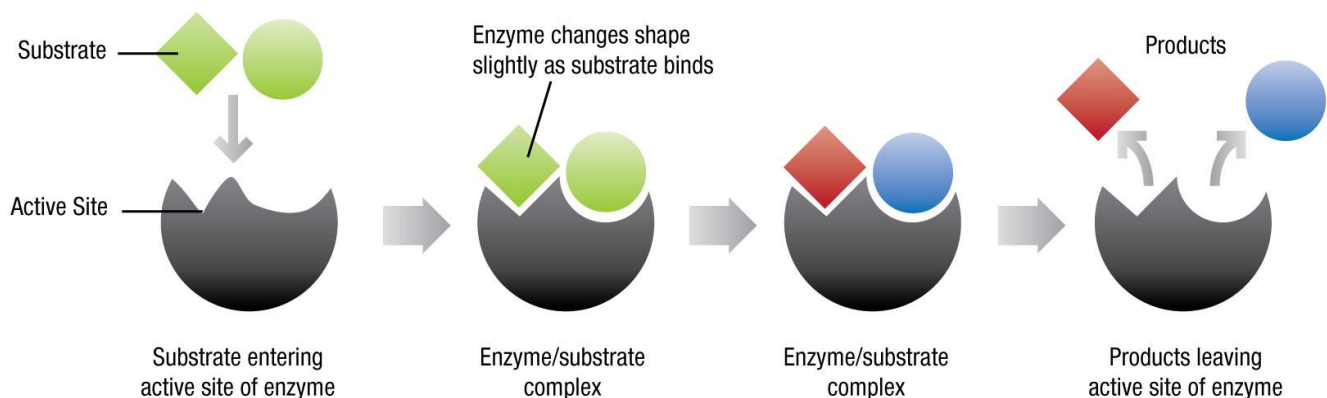
Using **SuperCoal™ Coal Enzymes** provides the following benefits:

- Reduces combustion air demand and exhaust (20~30%).
- Reduces exhaust temperature (100~250°C).
- Reduces SO_x (40~60%), NO_x (20~40%), smoke, particulate matter and smut.
- Reduces deposits on combustion chamber surfaces, and improve the boiler's heat exchange efficiency, which effectively results in reduction of its maintenance expenses.
- Increase energy usage efficiency and reduce coal consumption (4~15%).
- Prevents coal calorie loss and spontaneous combustion of any coal, up to 6 months after spraying **SuperCoal™ Coal Enzymes**.

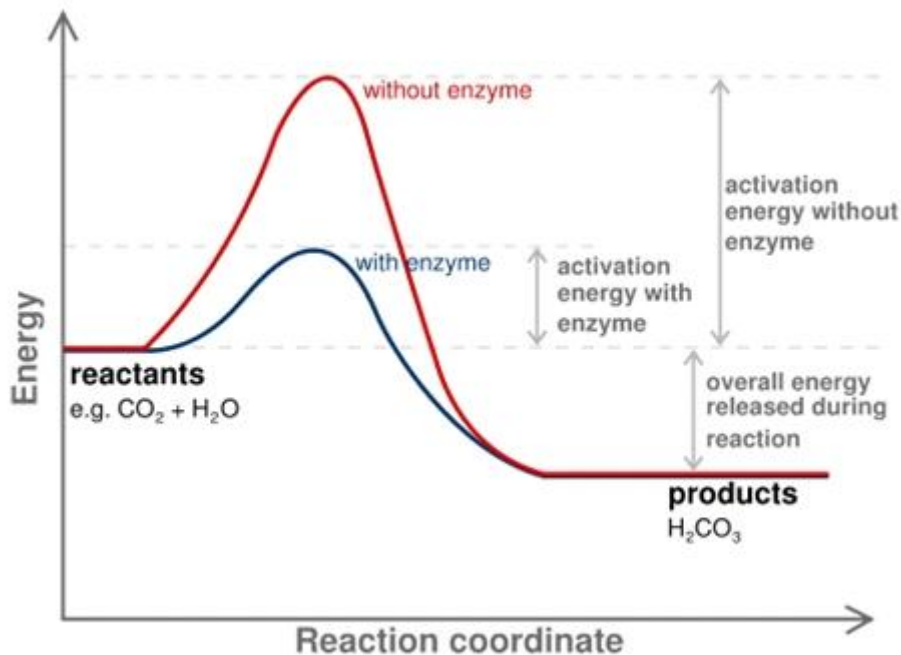
[Fundamentals]

SuperCoal™ Coal Enzymes is a group of enzymes produced under Nano technology, which is specifically formulated for bio-catalyzing the coal to alter its characteristics and conditions before combustion, for enhancing fuel efficiency and reducing pollutants during combustion.

SuperCoal™ Coal Enzymes are biomolecules which catalyze (i.e. increase the rates of) chemical reactions. In enzymatic reactions, the molecules at the beginning of the process (the substrates) are converted by the enzyme into different molecules (the products).



Like all catalysts, enzymes work by lowering the activation energy (E_a or ΔG^\ddagger) of a reaction, thus dramatically increasing the rate of the reaction. Most enzyme reaction rates are millions of times faster than those of comparable un-catalyzed reactions.



Enzymes can catalyze up to several million reactions per second. For example, the reaction catalyzed by orotidine 5'-phosphate decarboxylase will consume half of its substrate in 78 million years if no enzyme is present. However, when the decarboxylase is added, the same process takes just 25 milliseconds.

SuperCoal™ Coal Enzymes is the enzyme that is specifically formulated for bio-catalyzing the coal to alter its characteristics and conditions before combustion for enhancing its energy efficiency and reducing pollutants during combustion. **SuperCoal™ Coal Enzymes** applies Nano technology to increase the total bioavailability of the enzyme.

SuperCoal™ Coal Enzymes is a third generation product. One (1) liter of SuperCoal Coal Enzymes solution can be diluted by 100~200 liters of water, which can then be applied to approximately ten (10) tons of coal. It increases the energy output by 4%~15%. It can also reduce 40%~60% of SO_2 , 20%~40% of NO_x and 4%~15% of CO_2 pollutants (due to the reduction in the consumption of coal at the same output). The ash generated after combustion will be significantly reduced by 10%~25% and the carbon content in ash on LOI (loss on ignition) will be reduced by 14%~30%. The reduction of ash will relieve the workload for the precipitator, and can also reduce the transportation cost of ash and improve the value of ash for sales to the cement industry.

SuperCoal™ Coal Enzymes can be applied to various types of coal including anthracite, bituminous and lignite coals for utility plants and coke for steel plants. The application on low calorie coal of lignite will be very effective as well. **SuperCoal™ Coal Enzymes** can be applied to the coal immediately after they are mined. The benefits of energy improvement and pollutant reduction will not be lost over time during transportation or lengthy storage. Some kinds of coal will degrade 16% in heating value 3 months after they are mined through natural oxidation process. After applying **SuperCoal™ Coal Enzymes**, coal calorie loss is no longer a problem.

[Comparisons]

Before and after applying **SuperCoal™ Coal Enzymes**





TEST REPORT

Received Date : Mar. 10, 2008
 Report Number : PX/2008/3004402
 Report Date : Apr. 14, 2008
 The number of Page : 1 OF 1

Following Test Sample is provided and confirmed by client

Product Name : Nano Enzyme
Model/Type : *
Sample Number : PX3004401~02
Test Item and Method: Performance test

1. Formulate the diluted enzyme solution by incorporating 5 mL well-shaken Nano-Enzyme with 15 liters of DI water and 50g Ammonium Acetate.
2. Prepare the fuel coal powder: Have the fuel coal ground into tiny fine powder with an average mesh size of 80% pass 200 mesh.
3. Have the well-ground fuel coal powder dried to less than 17% water content.
4. Control test: Spray evenly on 1/2 of the well-ground fuel coal powder with tap- water.
5. Experiment test: Spray evenly on another 1/2 of the well-ground fuel coal powder left with the Diluted Nano-Enzyme solution.
6. Keep shoveling up and down the well-powdered fuel coal pile until it's evenly and thoroughly sprayed with the Diluted Nano-Enzyme Solution. Also keep shoveling up and down on 9:00a.m., 12:00p.m. and 17:00p.m..
7. Be sure to still it for at least 72 hours and avoid exposing it to sunlight.
8. Conduct the burning tests separately on both the Control test and the Experiment test.

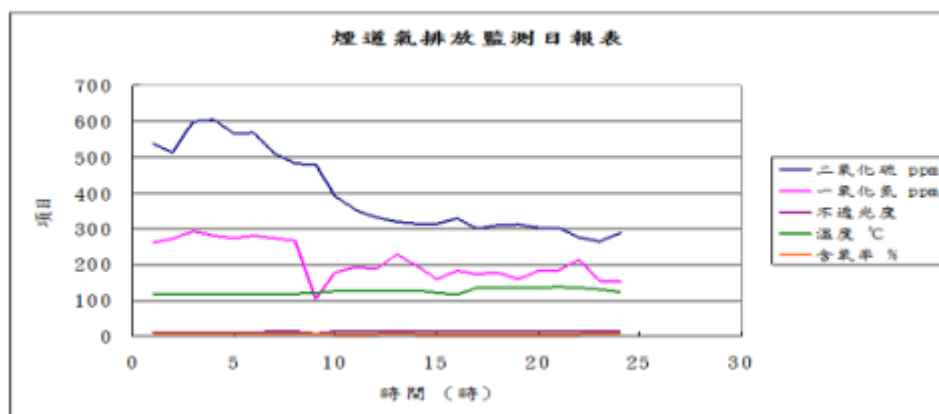
Test Result :

Test	Unit	Control test	Experiment test	Elimination ratio (%)
Nitrogen oxides (NO _x)	ppm	138	111	20
Sulfur dioxide (SO ₂)	ppm	9.4	7.8	17

[Field Test] Linkou Power Plant, Taiwan Power Company

测试报告

台湾电力公司林口发电厂



⇒台电林口电厂 (SO_x) 排放量降低46%及 (NO_x) 排放量降低42%

In 24 hours at the same loading (temperature),
 the emission of SO₂ and NO_x dropped significantly.
 (46% of SO₂; and 42% of NO_x)