

# **ASSESSMENT OF SPONTANEOUS HEATING OF SOME INDIAN COKING AND NON-COKING COALS**

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR  
THE DEGREE OF

**BACHELOR OF TECHNOLOGY  
IN  
MINING ENGINEERING**

BY

**RAJDEEP LAKRA**

107MN004



**DEPARTMENT OF MINING ENGINEERING  
NATIONAL INSTITUTE OF TECHNOLOGY  
ROURKELA – 769008  
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Under the guidance of  
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## **National Institute of Technology Rourkela**

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### **CERTIFICATE**

This is to certify that the thesis entitled “**ASSESSMENT OF SPONTANEOUS HEATING OF SOME INDIAN COKING AND NON-COKING COAL**” submitted by **Sri Rajdeep Lakra** in partial fulfillment of the requirements for the award of Bachelor of Technology degree in Mining Engineering at National Institute of Technology, Rourkela is an authentic work carried out by him under my supervision and guidance.

To the best of my knowledge, the matter embodied in the thesis has not been submitted to any other University/Institute for the award of any Degree or Diploma.

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# ABSTRACT

The auto oxidation of coal ultimately leads to spontaneous combustion which is the major root cause for the disastrous of coal mine. It is a slow process and the heat evolved is carried away by air. This process of self heating of coal or other carbonaceous material resulting eventually in its ignition is termed as “spontaneous heating” or “auto oxidation”. The auto-oxidation of coal is a complex physico-chemical process which is accompanied by the absorption of oxygen, formation of coal oxygen complexes and their decomposition leading to the liberation of heat. Therefore the assessment for this combustion is very much necessary. It depends upon different characteristics and properties of coal. Coal mine fire is a major problem worldwide and has been a great concern both for the industry and researchers in this field. Majority of fires existing today in different coalfields are mainly due to spontaneous combustion of coal. . It has been a major problem in the leading producing coal countries like Australia, India and China. The spontaneous heating susceptibility of different coals varies over a wide range and it is important to assess their degree of proneness for taking preventive measures against the occurrence of fires to avoid loss of lives and property, sterilization of coal reserves and environmental pollution and raise concerns about safety and economic aspects of mining etc. Although much research has been done on the subject, a proper assessment of the spontaneous heating susceptibility of coal needs to be done so that mine operators are notified well in advance and plan the working properly. Therefore, the determination of susceptibility of coals to spontaneous heating and their classification is essential to plan the production activities and optimize coal mine production within the incubation period.

The project deals with the assessment of various parameters of coal with the spontaneous heating tendency of coal. Eight coal samples were collected from Mahanadi Coalfields Limited (MCL), Orissa of Coal India Limited and another eight samples were collected from the different mines such as northern coalfield limited (NCL), Madhya Pradesh ; Bharat coking coalfield limited (BCCL), Dhanbad ; Tisco ; Iisco, Dhanbad. The project deals with assessment of various parameters determined by experimental techniques. The intrinsic properties as well as susceptibility indices of the coal samples have historically been considered to be prediction of self heating liability. Many methods are based on the measurement of the oxidation rate and ignition temperature.

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