ABSTRACT

In India, in particular, coal being the major source of energy, coal production will be boosted from the present rate of 210 million tonnes to 400 million tonnes by the end of this century and most of this coal will be mined from low-rank coal seams. As such, spontaneous heating problems become all the more important in India. Though this is a major problem and a large number of studies have been conducted all over the world, yet no simple universally accepted test for determining the liability of coals to spontaneous heating has been evolved.

The temperature differential techniques used to assess the tendencies of coals to spontaneous heating are much simpler, faster and to some extent simulate the process of spontaneous heating though at a faster rate.

Though the crossing point temperature has been widely used as a measure of spontaneous heating tendency of coal, this alone cannot be taken as an indication of its proneness to spontaneous heating and hence, some spontaneous heating liability indices based on Crossing Point Temperature Method or Differential Thermal Analysis Techniques have been developed earlier, whose validity is questionable, since the earlier investigations based on CPT or DTA did not consider the extent of oxidation of coal before experimentation. As the degree of oxidation of coal considerably affects the spontaneous heating tendency, it is essential to include and correlate the state of oxidation with liability index. Hence, in the present study, the temperature differential techniques viz., Crossing Point Temperature Method (CPT), Puff Temperature Method (PT), Flammability Method (FT), and Thermal Analysis (DTA/TG) Techniques have been used in determining the relative ignition temperatures and liability indices based on CPT and PT, stressing on the influence of the degree of oxidation on ignition temmperatures of coals.

9 coal samples from 4 coal fields were used for experimentation. The effect of proximate constituents viz. moisture and ash on spontaneous heating liability index gave an excellent fit for all the coals studied. The effect of petrographic components,mineral matter and inhibitors on ignition temperatures based on CPT, PT, FT and Thermal Analysis Techniques have been investigated. Furthermore, the effect of washing on crossing point temperature of one coal sample each, from three coalfields have also been studied as an extended study.

Key Words

1. Spontaneous heating 2. Ignition Temperatures, CPT, PT, FT
3. Crossing point curve analysis 4. Liability index
5. Susceptibility potential 6. Degree of oxidation
7. Coal washing 8. Suppression of spontaneous heating