

Haritchat Nongtakrai 2010: Spontaneous Ignition of Wood Fiber. Master of Engineering (Fire Protection Engineering), Major Field: Fire Protection Engineering, Interdisciplinary Graduate Program. Thesis Advisor: Mr. Sompob Jarunthammachote, Ph.D. 175 pages.

This research was aimed to determine the causes of spontaneous ignition which include pre-exponential function $\frac{A\Delta h_c}{k}$ and activation energy $\frac{E}{R}$ of fuel called fiber which was derived from Eucalyptus wood. The two factors are unique properties of fuel and will lead to finding the critical temperature. After that, we can division of materials by no fire caused by self – heating ignition and can evaluate the duration of burning. The fiber is the wood from wood processing industry with 12% humidity and chemical contamination (urea formaldehyde resin 9% and wax 0.7%). Sample fuels entered into the oven in cubic shape are 8, 64, 512 cm³, and cylinder shape are 196,636, 950 cm³ respectively.

The results show that the effective parameter of spontaneous ignition of the cubic and cylinder shape are equal at $\frac{E}{R} = 27,774 \text{ K}$ and $\frac{A\Delta h_c}{k} = 2.54 \times 10^{30} \frac{\text{K}}{\text{m}^2}$. It shows that fuel of the same properties regardless of their shape has the unique effective parameter. Thus, the company has a container which obtains fiber in rectangular shape, and its dimension is 4.5 x 14 x 2.75 m. We can say that fiber without the fire caused by spontaneous ignition will not occur unless the environmental temperature in the container exceeds 132 degrees Celsius, and if the container obtains the temperature as same as critical temperature (132 degrees Celsius), it will take the time to make the thermal runaway about 2 days.

Student's signature

Thesis Advisor's signature