

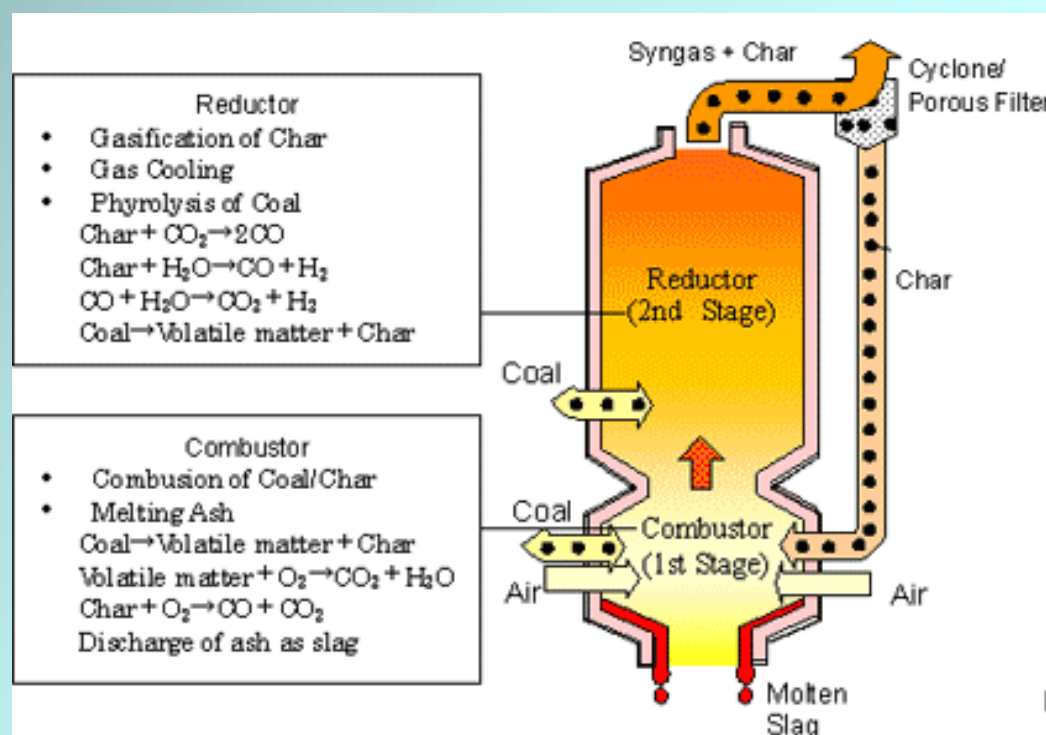
**Thermal characterization, gasification
and kinetic studies of different sized
Indian and Turkish coal and char particles**

par

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The pyrolysis, combustion, and gasification behaviors of high ash Indian and Turkish coal/char with different sizes were investigated using ATG–MS method. The results indicate that the ignition temperature, temperature of maximum mass loss rate and burn out temperatures of chars are occurred at higher temperature range when compare with similar sizes of coal. The smaller sized coal particles clearly exhibits devolatilisation and combustion stages in subsequent temperature ranges under oxygen ambiances which is identified through mass spectrometer results of evolved gaseous species. With the higher sized coal particles, these processes are continuously occurred.

As the size of the particle is increased, burn out temperature is also increased which is expected due to the lower reactivity of bigger sized particles. The size effects of the coal are not significant during the pyrolysis stage of the coal. The gasification process of the coal started above 800 °C at steam ambience. The complete burn out of both coal and char sample occurs at 950 °C which demonstrates the suitable gasification temperature with higher carbon conversion rate and gas efficiencies for high ash coal. The activation energy of the char particles is higher than the coal particles under oxygen ambience. The activation energy of the coal particles are varied from 30 to 32 kJ/mol at combustion process for Turkish and Indian coals. In the gasification regime, the activation energy of the Turkish coal is almost closer to the value of 65 kJ/mol in steam and steam blended ambiances. But, these values are varied from 84 to 147 kJ/mol in steam and steam blended ambiances for Indian coal. The activation energies are comparatively higher for the Indian coal under various ambient conditions compared to values for the Turkish coals. The activation energy in gasification process are not consistent for different sized coal and char particles which is due to the variation in reaction temperature, gas penetration through the particles and reaction mechanisms.