

# Analysis of activation energy of magnetohydrodynamic Tangent Hyperbolic Nanofluid with Cattaneo-Christov Heat Flux and non-linear Thermal Radiation

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**Abstract:** The activation energy (A.E.) of a radiative, mixed convective magnetohydrodynamic (MHD) Tangent Hyperbolic Nano fluid with Cattaneo-Christov *heat flux* and nonlinear *thermal radiation* across a sheet stretched linearly with velocity slip, zero mass flux boundary conditions was numerically investigated in the present article. Investigation and graphical interpretation of the effects of various factors on temperature, velocity, and concentration profile were conducted. The results obtained are very similar to those in the public literature. .The profile of velocity was observed for Slip Velocity Parameter ( $\gamma$ ) and power law index (n), Weissenberg number (We), buoyancy parameter (N) and Magnetic parameter (M). The temperature profile was observed for Weissenberg number (We), Magnetic parameter (M), Thermophoresis parameter (Nt), Thermal relaxation parameter ( $\delta_T$ ), Prandtl Number (Pr), Radiation parameter (R), Slip Velocity Parameter ( $\gamma$ ) and power law index (n), temperature ratio parameter ( $\theta_w$ ). The concentration profile was examined for velocity slip ( $\gamma$ ) and power law index (n), Activation Energy (A.E.), temperature difference ( $\delta$ ), Thermophoresis parameter (Nt), chemical reaction rate constant ( $\sigma^*$ ), parameter of Brownian motion (Nb), and Lewis Number (Le) .Additionally, local Sherwood number, *Skin* friction coefficient, and local *Nusselt* number were found for various values.

**Keywords:** *Activation Energy, Non-linear Thermal radiation, Tangent Hyperbolic Nano fluid, shooting method, Cattaneo-Christov heat flux, Velocity slip*