For Mackwnow:
I'm going to copy a page from Wikipedia with an engineering equation to give a reasonable representation

Convection vs. conduction
In a body of fluid that is heated from underneath its container, conduction and convection can be considered to compete for dominance. If heat conduction is too great, fluid moving down by convection is heated by conduction so fast that its downward movement will be stopped by its buoyancy, while fluid moving up by convection is cooled by conduction so fast that its driving buoyancy will diminish. On the other hand, if heat conduction is very low, a large temperature gradient may be formed and convection might be very strong.

The Rayleigh number (Ra) is a measure determining the result of this competition.

$$Ra = \frac{g \Delta \rho L^3}{\mu \alpha} = \frac{g \beta \Delta T L^3}{\nu \alpha}$$