



Kitchen Gadgets

Problem:

Cast iron is a popular metal for several cooking needs, both vegetables and meats across culinary traditions. One material science question that engineers designing more efficient cookware might ask is how to ensure an optimal, balanced heat transfer. In order to see what they are trying to improve upon, consider a pan that has a thickness of 0.125 inches and a radius of 5 inches. What is the heat transfer rate for each increase in 1 degree Celsius?

Note that the heat transfer rate \dot{Q} is found by using the material's thermal conductance (W/mK or BTU/s-ft-°F) k , the area of the surface the heat flows through A , the thickness of the material L , and the temperature difference ΔT .

$$\dot{Q} = kA \frac{\Delta T}{L}$$