Harold J. Morowitz gives an interesting, funny, and scientifically reinforced summary of the reasons why pizza is so dangerous in the fact that it burns the roof of people’s mouths. Essentially, the crux of the issue is that it is heated to a very high temperature, and is a very well insulated system. The pizza is approximated as three overlaying cylinders, the bottom cylinder representing the bread, the middle cylinder representing the tomato sauce, and the top cylinder representing the mozzarella cheese. All three layers are packed into a cardboard box, which has very low thermal conductivity. The bread is also said to have very low thermal conductivity due to the air pockets present in the structure of baked bread. Because of the two layers of relatively thick material and low thermal conductivity, an assumption that is made in the system is that heat that moves in the downward direction is negligible in comparison to the heat that moves in the upward direction.

Morowitz states that the heat moves through the system in three ways: conduction, convection, and radiation. Conduction is defines as the transfer of energy from the more energetic particles of a substance to the adjacent less energetic ones as a result of interactions between particles. Bringing back the idea that heat only moves upward in this system means that heat is transferred from the bread to the tomato sauce, and then from the tomato sauce to the cheese. This means that the cheese, the primary burning agent in pizza, is receiving a large supply of heat from both the bread and the tomato sauce, which is one of the reasons that the cheese stays hot for so long. Heat is also transferred by convection, which is defined by the mode of energy transfer between a solid surface and the adjacent liquid or gas that is in motion. Since the cheese is cooled by natural convection, meaning that there is no forced airflow over the pizza, the rate of convection is at a minimum, meaning that the cheese can release heat at a very small rate by convection. Heat is also transferred by radiation, which Is defined as the energy emitted by matter in the form of electromagnetic waves. Radiation is present in this system between the cheese and the box, as the cheese emits radiation if the form of heat toward the top of the box. Again, the cheese is not able to emit much heat in this fashion as the cardboard has low absorptivity. The amount of heat that the cheese can emit is further hurt by the fact that cardboard is an opaque material, and one of the properties of opaque materials is their ability to reflect some radiation, in this case back at the cheese.

Therefore the reason that cheese stays hot for so long is a combined effect of a high amount of heat being conducted to it from both the bread and the tomato sauce, and the low amount of heat emitted by convection and radiation.