Disk in gas

Consider a thin flat disk of mass M and face area S at temperature T_1 resting initially in weightlessness in a gas of mass density ρ at temperature T_0 ($T_1 = 1000\ T_0$). One of the faces of the disk is covered with a thermally insulating layer, the other face has a very good thermal contact with the surrounding gas: gas molecules of mass m obtain the temperature of the disk during a single collision with the surface. Estimate the initial acceleration a_0 and maximal speed v_{max} of the disk during its subsequent motion. Assume the heat capacity of the disk to be on the of order Nk_B, where N is the number of atoms in it, and k_B is the Boltzmann constant, and molar masses of the gas and the disk's material to be of the same order. The mean free path length of molecules is much larger than the size of the disk. Neglect any edge effects occuring at the edge of the disk.