

THE EQUILIBRIUM STATISTICS
OF A TWO-COMPONENT PARTIALLY
EXCITED MIXTURE OF GASES.

I. THERMODYNAMIC PROPERTIES

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S u m m a r y

We study a two-component mixture of gases of identical two-level particles, in which some particles are excited. The lifetime of the excited state is to a great extent larger than the time of establishing the equilibrium over translational degrees of freedom (the case of noncomplete equilibrium is realized), which allows one to study the equilibrium gas mixture properties for a given state of the electronic subsystem. In the system of identical differently excited atoms, new effective interactions arise – resonance dipole-dipole interactions. These interactions have a large influence on the equilibrium properties of the partially excited mixture of gases. A cluster expansion of the grand thermodynamical potential, taking into account the contributions from one, two- and three-particle groups, is constructed, and the virial state equation to within the third virial coefficient is obtained.