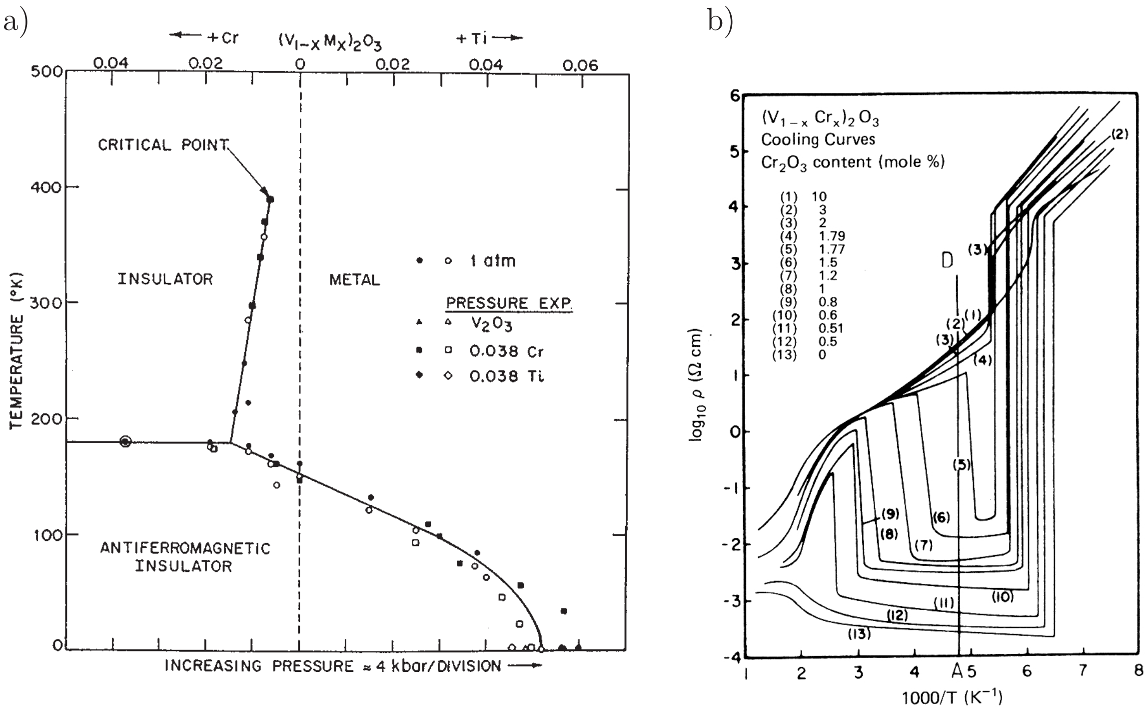

Figure 3.2: Experimental realization of Mott metal-insulator transitions in V_2O_3 doped with Cr or Ti. **a)** Phase diagram: transition temperatures as function of pressure and/or doping level (McWhan et al., 1971). **b)** Resistivity (log scale) as a function of inverse temperature (Kuwamoto et al., 1980).

where transition temperatures (vertical axis) are plotted as function of doping (upper horizontal axis) or pressure (lower horizontal axis). In this scaled version, both horizontal axes may be regarded as indicating the effective pressure or bandwidth. The low-temperature phase is seen to be antiferromagnetic and insulating for not too high effective pressure. Upon increasing the temperature, the system becomes paramagnetic and goes either into the PI or the PM phase. The latter two phases are separated by a roughly straight first-order phase transition line ending in a critical end point. Note that for ambient pressure the pure system is a metal which becomes insulating upon doping with Cr, quite contrary to the behavior for band insulators. In addition, the scaling law implicit in the figure makes disorder as the driving mechanism for localization of electrons less likely[3] since the influence of Cr doping can be offset by increased pressure which further supports the characterization of the MIT as being interaction driven. Of fundamental interest is the question whether the change in energy at the first-order transition line is of electronic origin. This problem is obscured experimentally by a simultaneous isostructural transition, i.e., a slight change of the lattice parameter at the MIT.

[3] While Anderson localization associated with diagonal disorder is, indeed, ruled out by the scaling law, offdiagonal disorder might be quantitatively important. On the other hand, disorder is clearly not an essential ingredient for a model description.