

Another effect was found when the chromel wire was measured. At zero pressure a negative emf was measured in the circuit with a fixed temperature difference maintained between the seals. The effect of pressure was to decrease this negative emf toward zero. It was found that chromel wire is quite strain sensitive and that in preparation it had been strained slightly. Tests were made using a strained and unstrained chromel wire as a couple. Figure 9 shows that the resulting emf is a linear function of permanent strain and is about linear in temperature difference. Similar strain tests were made with the alumel, platinum and platinum-10 percent rhodium wire, but no measurable strain-induced emf was detected. Hanneman and Strong⁽⁴⁾ have reported that they found no measurable strain induced emf for all four materials. Our experiments show that chromel is strain sensitive.

In solid media high-pressure apparatus, the methods used to bring leads out of a high-pressure cell generally result in a high degree of permanent deformation of the lead wires. Therefore, caution should be used when using chromel-alumel couples since an emf can be induced by the strain effects of the chromel. However, the amount of temperature correction is small, compared with the total emf of the couple. For instance, if a gradient of 350°C exists across a 10 percent strained wire, the resulting error would be only 1.5°C. To minimize this error, the high-pressure cell should be designed so that regions of high strain are in regions of low-temperature gradient.