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## The M5 and M4 Edges of Gold in the Pure State and in a Gold Copper Alloy

J. W. McGrath

*State University of Iowa*

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MEASUREMENT OF RELATIVE HUMIDITY BY  
MEANS OF THERMOCOUPLES

C. G. ANDERSON

A discussion is given of the construction and use of thermocouples as wet and dry bulb hygrometers for measuring the vapor pressure of water in small spaces. Experiments for determining the effect of thermocouple form, air velocity, and other factors affecting the reading of the instrument are described.

DEPARTMENT OF PHYSICS,  
IOWA STATE COLLEGE,  
AMES, IOWA.

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## PRESENT RÔLE OF ULTRASONIC WAVES IN PHYSICS

VICTOR B. COREY

The following are the significant results of modern researches in ultrasonics with regard to their contributions to theoretical and applied physics. Precision velocity measurements in gases, made over wide frequency ranges by means of the Pierce interferometer serve experimentally to substantiate the kinetic theory of gases; such measurements in liquids, made either by the interferometer, diffraction spectra, or visibility method, offer an independent and exact means for calculation of important physical constants of the liquids, and through detection of velocity dispersion, suggest a point of attack for investigation of liquid structure. Sound field amplitude photographs afford precise measurements of ultrasonic absorption in liquids. Certain physical constants of particular solids can be measured. Industrial applications are mentioned.

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THE M<sub>5</sub> AND M<sub>4</sub> EDGES OF GOLD IN THE PURE STATE  
AND IN A GOLD COPPER ALLOY

J. W. McGRATH

For most of the M<sub>5</sub> and M<sub>4</sub> x-ray absorption edges already measured there is a discrepancy between observed and calculated

values. The  $M_1$  edges occasionally have a small discrepancy while the  $M_2$  and  $M_3$  edges seldom show any. Siegbahn and Phelps have suggested that the final levels in the edge transitions are valence and low lattice levels and that the selection rule  $\Delta l = \pm 1$  is usually giving the transition preference. A change in atomic spacing of a metal, such as often results from alloying it, should produce a change in the energies of its lattice levels. The gold  $M_5$  and  $M_4$  edges from gold and from a 50 atomic per cent copper gold alloy were photographed in a vacuum spectrometer. Significant shifts to higher energies in  $M_5$  of 2.5 electron volts and in  $M_4$  of 6.8 volts were found. These results show that the final levels in M absorption transitions are lattice levels, and they give credence to the assumption that there are preferred atomic to lattice level transitions.

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### MEASUREMENT OF YOUNG'S MODULUS WITH SMALL STRESS

E. P. T. TYNDALL

A modification of the apparatus previously described by Van Allen has been designed and used for measurements on zinc and lead crystals.

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IOWA CITY, IOWA.

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### A DETERMINATION OF THE ADIABATIC ELASTIC CONSTANTS OF QUARTZ

PHILIP J. HART

If the elastic constants of a homogeneous, anisotropic material are known, it is possible to calculate the theoretical frequencies of the different modes of vibration between the faces of an infinite plate of the material. Conversely, knowing the frequencies of sufficient modes of vibration, it is possible to calculate the elastic