Meetings

Physics and Nondestructive Testing

The fundamental physics of the various methods and techniques used in evaluating material properties by nondestructive testing was the main theme of a symposium sponsored by the Southwest Research Institute, San Antonio, Texas (1–3 October 1963).

The objectives of nondestructive testing can be achieved only by knowing how and why materials fail. In this symposium papers dealt with the mechanisms for initiating cracks, and the role of flaws in the fracture of materials.

Ultrasonics has been used to investigate the physical properties of materials such as metals, semimetals, magnetic materials, semiconductors, ferrites, and insulators. Experiments were described for measuring properties, such as the magnetoacoustic effect, superconductivity, the effect of the magnetic field on sound velocity, dislocation damping, a depletion layer transducer, the ultrasonic amplifier, the acoustic-electric effect, the temperature dependence of ultrasonic waves in quartz, and measurement of internal stress in magnetic materials. A technique for simultaneously measuring both stress and strain by ultrasonic techniques has also been developed. Acoustic emission, the generation of elastic pulses within the material during deformation, was pointed out as another technique for studying materials and material properties. There is a possibility that acoustic emission may have a bearing on fatigue.

In discussions on the Mössbauer effect, the theory, as well as the application of this technique to materials and material properties, was noted. Specific problems dealt with measurements of nuclear properties, crystalline properties, interaction of nuclear and crystalline properties, magnetic effects, lattice dynamics, annealing of steel, study of glass, surface state, chemical bonding and complex ions, environmental sensors, velocity, and acceleration.

Developments during the past 4 or 5 years in solid-state detectors have pointed up both the advantages and limitations of these types of detectors. A review and discussion of nuclear activation analysis and its applications to measurement of submicrogram amounts of materials was discussed.

In the field of radiation, experiments using a 10- or 25-Mev accelerator and low-energy micro-focus x-rays were noted.

It was announced that the 1964 symposium on physics and nondestructive testing will be held 29 September to 1 October in Dayton, Ohio. The proceedings of the 1963 symposium are to be published and the price is $20 per volume. For further details contact Warren J. McGonnagle.

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Enzyme Regulation in Mammalian Tissues

The regulation of enzyme activity and synthesis in mammalian tissues were themes of an international symposium held 30 September to 1 October 1963 at Indiana University School of Medicine, Indianapolis. Since the theories that have been developed on the synthesis of enzymes in microorganisms are not necessarily applicable to the mammalian enzymes, this meeting afforded an opportunity to exchange ideas and clarify many problems unique to enzyme regulation in mammalian organisms. The regulation of enzymes in the liver was highlighted as a background to the understanding of the apparent failure of regulation of enzymes and metabolic pathways in liver cancer.

Concerning analysis of the metabolic control of gluconeogenesis through enzyme regulation, G. Weber (Indiana University) and H. A. Lardy (University of Wisconsin) discussed the regulation of gluconeogenesis through primary synthesis of key gluconeogenic enzymes. M. F. Utter (Western Reserve University) and Sir Hans A. Krebs (University of Oxford, England) outlined the regulatory effect of metabolites and enzyme activation in governing the rate of gluconeogenesis. In discussing the strategic steps of gluconeogenesis Weber showed that the activity of enzymes participating in gluconeogenesis markedly increases when gluconeogenesis is induced by injection of corticoid hormones, alloxan diabetes, or glycogen storage disease. This increase was inhibited by actinomycin, puromycin, or ethionine, indicating that new enzymes are synthesized in certain stages of gluconeogenesis. Weber also reported that when triamcinolone was administered there was an increase in the activities of glucose-6-phosphatase and fructose-1,6-diphosphatase within 4 to 6 hours. That insulin counteracts the increase in gluconeogenic enzymes induced by corticosteroid hormones suggested that insulin might act as a biological repressor of a sequence of gluconeogenic enzymes genetically located on the same operon.

Lardy demonstrated that phosphoenolpyruvate carboxykinase was markedly increased under gluconeogenic conditions, such as fasting, glucocorticoid administration, or in diabetes induced by alloxan, pancreatectomy, or mannoheptulose. The changes in this enzyme activity appear to be the result of new protein synthesis as demonstrated by the inhibition by ethionine, puromycin, and actinomycin. In contrast, the malic enzyme did not respond to gluconeogenic conditions, but markedly increased after administering insulin.

Utter presented evidence concerning the postulated mechanism for the catalysis of phosphoenolpyruvate formation, the steps being the formation of oxalacetate from pyruvate and the production of phosphoenolpyruvate from this compound. He found that pyruvate carboxylase was cold labile, a factor which had retarded progress in this field until this property of the enzyme was discovered. Utter also showed that the amount, distribution, and properties of pyruvate carboxylase and phospho-