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Abstract Papers

NUCLEAR REACTOR DEVELOPMENTS

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ABSTRACT

A series of thirty slides was shown to illustrate the nature of the nuclear reactor types. Comparisons were made of the natural uranium reactors employing graphite and heavy water as moderator; the use of natural and enriched uranium; homogeneous and heterogeneous fuel-moderator assemblies; and thermal, intermediate and fast reactors. More than 25 nuclear reactors have been built and operated; about twelve or more are in advanced stages of design or construction; and about six or more are in initial design stages. Currently, more than eleven countries are planning new reactor developments.

A PRECISE METHOD FOR DETERMINING THE ANGLE OF MINIMUM DEVIATION WITH AN EQUILATERAL PRISM

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ABSTRACT

A beam of parallel light entering an equiangular prism suffers internal reflections to the three polished faces and emerges as a parallel beam at an angle equal to the angle of incidence. This fact, together with the familiar conditions for minimum deviation for light on one wavelength, makes it possible to determine the prism position for minimum deviation of this wavelength light as that which brings the collimator slit image formed by the internally reflected light into coincidence with the slit image formed by the monochromatic light in question.

METHODS OF BIOLOGICAL ASSAY AND THEIR CLINICAL APPLICATION

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ABSTRACT

Microbiological assays afford a means of determining quantitatively and/or qualitatively the presence of a substance to which the assay organism is sensitive. The microorganisms employed included such diverse groups as yeasts, molds, bacteria, protozoa and algae.

Assays appear to have developed along two general lines. In the first, substances which are necessary for or accelerate growth are determined. These include the vitamin and amino acid types of assay. The other general type of assay is employed to determine substances which are inhibitory to the growth of microorganisms. This type of assay is of value in finding new antibiotics, determining blood levels of the antibiotics and the sensitivity of pathogenic bacteria to them.

Amino acid and vitamin assays are carried out in media which contain all the materials required for growth except the substance being assayed. A series of tubes is set up with increasing increments of the stimulatory test substance in the medium. In an assay which is properly carried out, the response of the organism will be proportional to the amount of the test substance present; when the degree of response is plotted for each tube in the series, the result is essentially a straight line known as the dose response curve. The type of response employed in the assay may vary with the type of organism used; among the methods successfully employed are: (1) the degree of turbidity produced by the growing organism, (2) the amount of fermentation acid produced or (3) the dry weight of mycelium formed.

The amount of the stimulatory factor present in a sample being assayed is determined by direct comparison of the degree of response of various concentrations of the sample with the known dose response curve.

Search for new antibiotics is carried out largely by determining the effect of soil microorganism on pathogenic bacteria. Soil forms which successfully inhibit the growth of pathogens are then employed in the isolation of the inhibitory material. Once an antibiotic is isolated and is proven not too toxic for humans or animals, its ability to cure infections is determined. To be clinically successful, an antibiotic must be present in sufficient quantities to act upon the pathogen within the body. A microbiological assay is employed to determine whether high enough concentration of the antibiotic is present in the blood. In these determinations increasing quantities of blood are put into a series of tubes conaining medium inoculated with a susceptible pathogen. The amount of the inhibitory substance in the blood is determined by comparing the highest dilution of blood which inhibits growth with a standard set of media containing known concentrations of the antibiotic which will also just inhibit growth of the same organism.

After antibiotics have been used for sometime, pathogens arise which formerly were sensitive to the agent but have developed an insensitivity. It is important clinically to isolate these organisms to test them against the antibiotic. This type of assay has many modifications, but essentially the pathogen is inoculated into or on media containing increasing concentrations of the antibiotic. The lowest concentration of the inhibitory agent which stops growth of the pathogen should be less than the amount which can be introduced into the body.

Many new types of assay are now appearing using purposely developed mutant strains of organisms for specific compounds.