

Analytic Source

In a new source for spectro-chemical analysis, the two functions of the source, those of getting the sample material into the discharge and then exciting it, are separately controlled. The sample under test is contained in a carbon cup which is heated to a controlled temperature by means of an induction heater. A copious, steady, and controllable supply of sample material is thus injected into the spark. The sensitivity of the source to trace impurities is equal to that of the DC arc and the reproducibility of spectral line intensities is about equal to that of the AC spark.

In a series of spectrograms of a given sample taken at increasing temperature of the sample it is found that spectral lines appear when the temperature of the sample is about equal to the boiling point temperature of the substance which gives rise to those lines, whether the substance is an element or a compound. If the sample is a mixture of zinc and cadmium, the cadmium lines appear at a lower temperature, while with a mixture of cadmium bromide and zinc iodide the zinc lines appear first. It is thus possible to get some information about the compounds as well as the elements in a sample.

A.G.R.

A New Source for Spectro-Chemical Analysis. By Arthur G. Rouse. *J. Opt. Soc. Am.*, 40: 82, February, 1950.

Spectrograph

A simple oscillating circuit for detecting nuclear magnetic resonance absorption has been developed that makes use of an electronic negative resistance to maintain oscillation. The sample is contained in a fixed magnetic field to which is added, locally, a small modulation. As the oscillation level is adjustable, a chosen level can be maintained continuously throughout the tuning range of a single coil, allowing a slow, continuous search to be conducted over the frequency interval. Broad, weak resonances are displayed on a recording meter utilizing a lock-in amplifier driven at the modulation frequency, whereas intense resonances may be displayed directly on an oscilloscope. Searching may be accomplished automatically with the recording system by applying a clock drive to the tuning condensers.

The device's sensitivity has been shown to be near the limit set by thermal agitation noise in the tuned circuit and it has a response that uniquely measures the absorption part of the resonance effect. It is, therefore, particularly suitable for observing line shapes, structures, and small shifts in resonance frequencies, and for accurately measuring ratios of g-factors. For measuring magnetic fields, the only auxiliary equipment required is an oscilloscope and, for precision work, a frequency meter. It has been operated over the range from 45 to 0.4 megacycles per second, allowing field measurements from 100 to 10,000 gauss with protons, and to upwards of 25,000 gauss with Li^7 or deuterons. A sample volume of about 0.25 cc is adequate in these ranges.

R.V.P.

A Radio-frequency Spectrograph and Simple Magnetic-field Meter. By R. V. Pound and W. D. Knight. *Rev. Sci. Inst.*, 21: 219, March, 1950.

Mathematical Biophysics

Torres and Salamanca of the University of Madrid assume that at each opening of the pylorus a fixed fraction of the liquid contents of the stomach empties into the intestine. This leads to the exponential equation for the amount retained in the stomach as a function of time. On the basis of this equation another is derived which gives the rate of secretion of gastric juice as a function of time. The expressions are found to be useful in some experimental investigations.

A contribution to mathematical social psychology is made by N. Rashevsky, who considers the tendency to choose one of two alternative forms of behavior influenced by imitation. The strength of stimulus to imitate is measured by the number of individuals in the group engaging in the activity imitated.

It is shown that under certain conditions, the initial "indifference" of the population to either of the two forms of behavior is unstable, so that a slight fluctuation in either direction may suddenly shift the behavior pattern toward a "stable" configuration in which most individuals exhibit one of the two behaviors.

If now the distribution of the "inherent" bias changes in the opposite direction, there will be a certain threshold distribution beyond which the behavior pattern will be thrown into an opposite stable configuration.

In another note Rashevsky discusses the possible neural mechanisms of hedonistic behavior under the assumption of a maximized satisfaction function.

A. Rapoport's second paper on peck right postulates certain probabilities of "mutation" of social structure of a flock, where each mutation results from a reversal of peck right between two individuals (not every reversal leads to a mutation of social structure). It is shown that under these assumptions, the probability distribution of the various possible social structures will tend to a limiting distribution with time.

In the case of a flock of three individuals, it is shown that if peck right reversals are completely random, the final distribution is identical with the initial distribution under the assumption of random establishment of peck right.

I. Opatowski discusses the various types of analyses of existing data on spontaneous and x-ray induced mutations of the tobacco mosaic virus. It is shown that if virus protein is the x-ray absorbing medium through which the mutation is induced, 3 percent of the total virus protein would be involved in this process. On the other hand if nucleic acid is the medium of absorption of the ionizing energy, then 25 percent of the amount of acid existing in the virus would be needed.

G. Karreman applies the approximation methods of Kryloff and Bogoliuboff to show the existence of a threshold for a nonlinear differential equation involved in some types of relaxation oscillations. Thus a relation is shown between relaxation oscillations and all-or-none phenomena.

A. RAPOPORT

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