JOURNAL NOTES

Hot Wax

Although much is known of the effect of radiation upon gases and systems containing water, relatively little is known of its effect on organic nonconducting materials. The present study gives a quantitative treatment of the effects on paraffin wax irradiated by means of uranium and carbon 14 sources; it was possible to compute the amount of beta radiation absorbed by the wax for various exposure times.

The effect actually measured was the increase of electrical conductivity in the sample during irradiation, as well as the decrease of conductivity observed after the source was removed. An estimate could then be made of the number of ion pairs produced per unit energy absorbed, that is, the efficiency of ionization. The efficiency is in this case markedly lower than it is for irradiated gases because the majority of ions produced recombine quickly. Only a fraction of all ions, probably the small ones, are immediately swept away by the applied electric field and thus escape recombination, and it is this fraction which the method determines.

Since ionization is the primary effect of radiation, a study of this kind gives essential information on the expected chemical changes of organic dielectrics under irradiation. The research might be continued by using hydrocarbons of varying chemical constitution in order to establish the role of specific groups with respect to the efficiency of ionization. A.G.

Ionization of Paraffin Wax by Beta-Radiation. By Andrew Gemant. *Jour. App. Phys. 20: 887, October, 1949.*

Cool Crystals

A relatively simple method has been developed for low temperature x-ray diffraction studies of materials which are not normally solid at room temperature. The technique was developed in the course of an x-ray investigation of the structure of cyclo-octatetraene and benzene.

The sample is sealed in a thin-walled glass capillary which is contained in an insulating, double-walled, cylindrical specimen holder constructed of thin, unstressed polystyrene film, which permits visual observation and has a low absorption of x-rays. The specimen is cooled by a jet of cold compressed gas, and may be oscillated or rotated completely. A horizontal polarizing microscope, mounted on the apparatus, is used to determine position and orientation as the freezing point for anistropic crystals is observed.

Multicrystalline powder specimens are obtained by rapid freezing of the sample. For single crystals, the quick frozen powder specimen is partially melted, then slowly refrozen, which usually results in single crystals sufficiently large for diffraction work. The apparatus is so constructed that the polarizing microscope may be removed and x-ray diagrams made without disturbing the specimen.

This technique is applicable to a large number of materials, both liquid and gaseous, whose structures have not been determined. It is expected that further developments along these lines will provide an independent check on structural details of molecules which have heretofore been studied only by electron diffraction or spectroscopic methods. H.S.K.

A Low Temperature Single X-Ray Diffraction Technique. By H. S. Kaufman and I. Fankuchen. *Rev. Sci. Inst. 20: 733, October, 1949.*

Wide Range Monitor

The gamma radiation associated with many instruments and experiments in nuclear physics can be a grave danger to the operating personnel. Constant vigilance is necessary to make certain that the tolerance dose (one-tenth roentgen per day) is not exceeded. In many cases, particularly near large ion accelerators, the radiation levels encountered may range over a factor of ten thousand or even one hundred thousand. To cover such a large range with one monitoring instrument is usually very difficult, particularly if completely unattended and automatic operation is required.

The recent development of the scintillation counter permits a comparatively simple solution to the problem because it is sensitive and lacks saturation effects at high radiation levels. The technique employed in this wide range radiation instrument is to integrate the pulse current output of the scintillation counter's associated photomultiplier tube. The direct current voltage so obtained varies directly with the gamma intensity and is measured by comparison with a reference potential derived from a potentiometer, portions of which are shunted by fixed resistors. The potentiometer is driven by a servo motor arranged in the usual null circuit.

The comparison voltages available from the potentiometer range over a factor of one hundred thousand which is, therefore, the dynamic range of the servo system. A large needle is attached to the potentiometer shaft to indicate radiation level. The instrument will measure intensities from one milliroentgen per hour to one hundred roentgens per hour to an accuracy of better than fifteen percent on the single five-decade scale and is approximately linear in each decade. The upper radiation limit is determined by the onset of fatigue in the photomultiplier while the lower limit is due to dark current noise in the tube. However, techniques are described in the paper which result in cancellation of most of the dark current and, therefore, permit a considerable extension in the range of the instrument beyond five decades. L.R.

A Wide Range Radiation Instrument. By Leonard Reiffel and Glenn Burgwald. *Rev. Sci. Inst. 20: 711, October, 1949.*

Microscope Objectives

A new series of microscope objectives has been studied with which the microscopist may make visual observations and take ultraviolet photographs without altering the focal setting of his instrument. The present demand for microscopes capable of operating in the near ultraviolet region cannot be satisfied by instruments whose