

Quartz Spectrograph.

During the year the spectrograph was in continuous use for general laboratory work and for investigational purposes. From time to time examinations were made of various metals for the Defence Department and the Post and Telegraph Department. In miscellaneous work, where the greatest sensitivity is not desired, the use was developed of the interrupted arc with high-frequency pilot (Pfeilsticker arc). This has been regularly used for the estimation of strontium in rock analysis. Various corrosion products were examined. In the case of corrosion thought to be due to sea-water the ratio of sodium to other metals in the corrosion product was found to be much higher than in sea-water, but the clearest indication was given by the absence of strontium, easily detected in sea-water, so that the evidence pointed to some other corrosive agent. For the investigational work on trace elements in biological material the arc on graphite electrodes is used. The examination was completed of the ash of samples of milk from various areas of good and poor soils in the North Auckland district. No definite correlation was found between the amount of any minor element and the character of the soil. An investigation was made of the leaves of citrus trees suffering from mottled leaf. The manganese content of the mottled leaves was definitely less than that of the healthy leaves. Pears were examined in connection with the "corky-pit" trouble. In pears, in contrast to apples, this is not amenable to boron treatment. A qualitative examination did not show any marked differences in the minor elements in sound and unsound fruit, and it will be necessary to make quantitative estimation of the various elements detected. Towards the end of the year work was begun on the first of the series of pasture samples from eight districts, under the programme of the Spectroscopic Committee.

Thermal Regions, White Island.

In November a member of the staff visited White Island to co-operate on the chemical side with Dr. P. Marshall, who is carrying out further investigations on the thermal regions. During a stay of one and a half days temperatures of fumaroles were measured with a pyrometer, and samples of gas, condensed steam, and water were brought back for analysis in the laboratory.

CHEMICAL ENGINEER.

An investigation is in progress on the design of a commercial dryer for grass-seed. The work was undertaken on behalf of the Plant Research Bureau and follows that carried out by Messrs. Foy and Hyde (*New Zealand Journal of Agriculture*, 49, 10, 1934, and 51, 40, 1935) on the prevention of deterioration of Chewings-fescue seed by drying and storage in suitable containers. In order to prevent deterioration it was found by these workers that the seed should be dried to a moisture content below approximately 9 per cent. or 10 per cent. After a considerable amount of experimental laboratory work a semi-commercial dryer has been built. The dryer works on a counter-current principle and has a capacity of 70 lb. to 80 lb. dried seed per hour. This dryer, the design of which is covered by a provisional patent, has functioned satisfactorily, and the results so far obtained appear sufficiently encouraging to warrant the preparation of designs for a dryer several times larger. The question of providing suitable moisture-proof containers for the dried seed is also under consideration.

In addition, the chemical engineering staff has also been engaged on the problem of measuring the outflow from agricultural drains in connection with field-drainage experiments being carried out at Massey College, the design of special apparatus for the Plant Research Station, Palmerston North, and in furnishing reports on various industrial and technical subjects, including the processes mentioned in the paragraph headed "*Phormium tenax*."

LIBRARY.

The appointment of a librarian has been fully justified by the greater use now possible of reference books and journals. The books are being reclassified on the basis of the Universal Decimal System, which should give more ready access to information on any desired subject. A system of indexing useful articles in periodicals and journals has been inaugurated, and is affording a valuable key to current literature. Already there are approximately five thousand entries. Accessions during the year total 250 volumes, bringing the number of books up to 2,000, exclusive of bound journals and serial publications. Eight periodicals have been added to the list of publications regularly received.

ADVISORY AND CONSULTING WORK.

The senior members of the staff have been frequently consulted on scientific and industrial matters. They have also represented the Laboratory on various Standards Institute and other interdepartmental committees.