

Some mobile producer-gas plants have been tested for licensing purposes during the year. A number of Government type B producer-gas plants, designed in collaboration with this Section, are in operation and are giving satisfactory service.

The Section has been called upon to design pieces of laboratory equipment and to give advice on problems connected with the establishment of industries.

ORGANIC SECTION

Medicinal Plants.—A large number of analyses have been made of drug plants grown both for export and for experimental purposes. Plant materials examined included *Digitalis purpurea*, *D. lanata*, *Belladonna*, *Hyoscyamus*, *Stramonium*, and other *Datura* species, *Artemisia absinthum*, opium poppy, and the New Zealand native pukatea bark and koromiko leaf. Lavender, peppermint, coriander, fennel, castor-seeds, and olives were examined for yields and quality of oil.

Army and Air Departments.—A wide variety of materials were examined including nitrocellulose dopes, camouflage and finishing colours, hydraulic fluids, compass fluids, rubber, engine sludges, &c., in connection with manufacture and maintenance of aircraft, waterproofing preparations for hand grenades, electrical equipment, maps, and food-cartons. Foodstuffs were analysed for vitamins B and C.

Miscellaneous.—A large series of pine-wood samples were examined for seasonal variation of resin content in connection with an investigation being carried out by the State Forest Service.

Rotting of tenting in the Rotorua district was found to be due to the action of sulphuretted hydrogen on the copper rot-proofing compounds in the canvas.

Petroleum and tars and tar distillates were examined for toluene content.

Seaweeds for Arsenic.—Twelve samples of seaweed (*Gigartina*) were examined for arsenic for the Botany Division. The amount of arsenic trioxide found varied from 0.017 grains per pound to 0.17 grains per pound calculated on the oven-dried sample.

Dermatitis from Watch-strap.—A wristlet-watch strap, stated to have injurious effects on the skin, was found to contain a considerable amount of coal-tar dye. A chrome tanned leather, stained with resorcin brown, has been used, and the raw cut edges had been dyed with a second coal-tar dye. There was definite evidence that the straps had caused dermatitis.

SPECTROGRAPHIC ANALYSIS

The large quartz spectrograph is now mainly used for the examination of metals for Government Departments, and much of the work is connected with the war. For testing for compliance with specifications for content of impurities, the A.S.T.M. solution method has been modified for application to brasses, lead, copper-cadmium, phosphor-bronze, zinc, aluminium, and steel. A special method has been devised for solders. Spectrographic analyses were also made of general laboratory samples—for example, the examination of plaster for lead. The only biological work carried out was the examination of the bones of lambs suffering from osteoporosis. The spectrograph has also been of use in forensic work. The small glass instrument has been used daily for the examination of zinc-base die-casting alloy, samples of which now come from four factories. It is occasionally useful for other metals, especially aluminium.

COAL SURVEY

The physical and chemical survey of the Dominion's coal resources has been continued by the Coal Survey Laboratory and by the field staff appointed by the Geological Survey. Work in the Greymouth field is now nearing completion. A number of field reports have been made on areas in the Greymouth district and also for the new North Island State mine areas of Tatu and Mangapehi. The Coal Survey has issued seventeen reports during the year and has undertaken a number of investigations on behalf of Government Departments and for private companies.

Analyses have been made of a large number of coals from the Strongman, Mangapehi, Tatu, and Wallsend Mines. Bore samples from the Westport Coal Co. have been examined. Co-operative mine samples have also been analysed. Producer fuels for mobile units and for a Wellman industrial producer have been reported on and recommendations made. Analyses were made of fuels used in the Sesei furnace of the New Zealand Railways workshops, and it was shown that according to the constitution of the ash, Paparoa coal would be suitable and Waikato char unsuitable for use with an acid-lined furnace. A number of shades from Nevis, Otago, were too high in ash content (74.93 per cent.) to allow of commercial development. A shale from Freshford gave 38 gallons of crude oil per ton. One of the main concerns of the Section during the year was the successful production on a commercial scale of activated carbon from Samoan coconut shell charcoal for use in gas-mask canisters. An entirely satisfactory product was produced. Two gases examined from west coast oil-prospecting bores consisted wholly of methane and gave no indications of oil. A number of smokeless solid fuels and the different ways of packaging them were investigated on behalf of the Military authorities. Other analyses included those of charcoals and peats. On behalf of the Wellington Fire Brigade four Salvus valves were adjusted to deliver oxygen at the required rate.

THERMAL REGIONS

A member of the staff visited Tokaanu and determined the amounts of steam and water being ejected from two bores recently sunk in the Tokaanu alkaline area. Samples were brought back for determination of boric acid and ammonia in the water and steam. During the construction of new buildings by the Public Works Department at the Rotorua