

hands have qualified themselves as reliable assayers of bullion, of ores, of gold, silver, lead, tin, antimony, &c., also of tailings and concentrates; and, although there is only a limited demand for assayers, the fact has now come to be generally admitted that an accurate knowledge of assaying and valuing different ores, particularly those of gold and silver, is a necessary qualification in those engaged in the extraction of gold and silver in batteries and reduction-works. The complex character of the up-country ores has also forced upon miners and prospectors the necessity of possessing at least an elementary knowledge of assaying and metallurgy. It is a well-known fact that the great bulk of the valuable ores from the Waiomo, Hikutaia, Komata, Waitekauri, Waihi, and Karangahake districts seldom afford even an approximation to their true value by the prospector's method of rough crushing and panning. This can only be ascertained by thoroughly sampling a bulk parcel of the ore, and then subjecting it to a fire-assay.

"In the beginning of February of this year the Hon. R. J. Seddon, Minister of Mines, engaged Mr. A. Purdie, M.A., of the Otago University, as my assistant for three months. Mr. Purdie began his duties in the middle of February, and for two months took charge of this class as well as the ordinary and Saturday chemistry classes. He expressed surprise at the large number of students and the thoroughly practical and advanced character of the instruction. He conducted his classes with zeal and all his ability, and left for an appointment in Victoria on the 21st April.

"*Practical Chemistry and Laboratory Practice.*—The extraction of the precious metals from the complex low-grade ores of these goldfields, as well as those of Australia and Tasmania, presents a number of scientific problems, involving not only an acquaintance with mechanics and hydraulics, but also an intimate knowledge of the reactions of the different metals under varying conditions, and of the laws which regulate their combinations. The different operations of the metallurgist should be governed by the chemical affinities and reactions of the ore he is treating, either with fluxes or chemicals, and the successful treatment of low-grade ores will in the future demand an extensive practical knowledge, backed by skill in chemical manipulation and processes.

"The class devoted to practical chemistry has been already productive of much good, and many of the advanced students are competent to analyse coals, soils, waters, complex ores, and slags. Some of the more interesting analyses performed in the laboratory during the past year are as follow :—

"*Brown Coal, Waitakururu, Thames Firth, analysed by Mr. J. Robinson.*

<i>" Upper Seam, 13ft.</i>						
Fixed carbon	...	...	...	...	...	49.01
Hydro-carbons	...	...	...	...	...	30.15
Water	...	...	...	...	...	15.72
Ash	...	...	...	...	...	5.12
						100.00

"Evaporative power, 6.38lb; sulphur, 0.95 per cent.

"*Middle Seam, 7ft.*

Analysis.	Fixed Carbon.	Hydro-carbons.	Water.	Ash.	Sulphur.	E. and P.
J. Sheppard	45.12	34.50	15.41	4.97	...	5.86
J. McPeake	44.02	36.80	14.10	5.08	...	5.72
Geo. Fleming	44.61	36.41	13.78	5.20	1.02	5.79

"*Remarks.*—These are valuable coals, well adapted for steam or household purposes. Friable, ash-grey to buff colour.

"*Bituminous Coal, Coromandel, analysed by Mr. J. Shepherd.*

Fixed carbon	...	...	...	...	...	62.25
Hydro-carbons	...	...	...	...	...	30.14
Water	...	...	...	...	...	5.02
Ash	...	...	...	...	...	2.59
						100.00

"This coal is from a thin irregular seam, imbedded in the auriferous tuffs near Paparoa. The coal is suitable for smithy or steam purposes, but the seam is too thin to be of any value. Bright, shining, crumbling, ash-grey; evaporation power, 8.09lb.

"*Ferro-manganese, Waiheke Island, analysed by Mr. W. O. Bell.*

	No. 1.	No. 2.
Manganese-oxides	45.92	60.12
Iron-oxides	32.17	28.86
Alumina	10.31	3.94
Silica	9.64	6.15
Water and loss	1.96	0.93
100.00		100.00

"These are valuable ores for the manufacture of manganese steel, and if found in large quantities in places accessible to deep water could be exported with profit to Great Britain.