

version temperature for air, however, calculated by Witkowski from the empirical formula of Rose-Innes, was $+360^{\circ}$, whilst the van der Waals formula was found to require an inversion temperature of $+500^{\circ}$; in the latter case, however, the calculation is based on the assumption of a small difference of pressure (1 atmosphere) accompanying the expansion, whilst the experimental values refer to expansion over a wide range of pressure. The shape of the curve for air connecting the inversion temperature with the initial pressure at which expansion occurs shows that below 80 atmospheres a rapid fall of the inversion temperature occurs as the pressure is diminished. Very little cooling effect is therefore to be anticipated with air allowed to expand from pressures below 80 atmospheres; such, indeed, is actually observed to be the case, liquefaction only taking place readily in the apparatus described by Prof. Olszewski in 1902, so long as the initial pressure does not fall below this limit.

STUDENTS IN GERMAN UNIVERSITIES.

ACCORDING to the *Chemiker Zeitung*, the total number of matriculated students in attendance at the German universities during the present winter semester is 45,136, as against 44,942 last summer, and 42,390 in the preceding winter; five years ago the attendance was 35,518, ten years ago 30,043, twenty years ago 27,080, and thirty years ago, that is, in the winter 1876-7, it was only 17,457, upon which total the present number shows an increase of 27,679, or 159 per cent. It is of more than passing interest to compare the number of students at the different universities to-day with those of thirty years ago:—

	1906-1907	1876-1877		1906-1907	1876-1877
Berlin ...	8188	2490	Tübingen ...	1522	903
Munich ...	5567	1280	Marburg ...	1503	382
Leipzig ...	4466	3026	Würzburg ...	1407	1028
Bonn ...	2992	793	Jena ...	1275	439
Halle ...	2250	854	Königsberg ...	1140	621
Breslau ...	1961	1219	Giessen ...	1097	318
Göttingen ...	1831	991	Erlangen ...	1056	474
Freiburg ...	1744	293	Kiel ...	877	219
Strassburg ...	1652	707	Greifswald ...	827	468
Heidelberg ...	1603	473	Rostock ...	645	156
Münster ...	1533	313			

The distribution of these students in the various branches of academic study is as follows:—

	1906-1907	1876-1877
Law students ...	12215	4835
Art students ...	10873	3874
Medical students ...	7035	3374
Mathematical and science students ...	6116	2009
Evangelical theology ...	2208	1518
Pharmaceutical students ...	1865	680
Catholic theology ...	1708	1164
Students of economic sciences and forestry ...	1235	155
Agricultural science ...	985	369
Dentistry ...	870	8
Veterinary Science (only matriculated at Giessen) ...	110	0

Against these numbers it is to be remarked that the large number of applied and pure science students attending the Technische Hochschulen is not included here, while the number of arts students is too high by nearly 1000, owing to the modern custom in the Prussian universities' returns of including among such students those whom they place under the tabulation heading "Sonstige Studienfächer der philosophischen Facultät."

Out of a total number of 45,136 students in attendance at German universities during the present winter half-year, 4151, or 9.2 per cent., are described as foreigners, against 8.6, 8.4, and 7.5 per cent. in the preceding half-years. The absolute increase of 596 on the number for the corresponding semester of last year (namely, 3555) is almost exclusively due to an increase in the number of Russian students, who have increased from 1326 to 1890 in one year. Of the 3717 students belonging

to European countries, 681 are from Austria, 341 from Switzerland, 144 from England, 139 from Bulgaria, 83 from Roumania, 61 from Servia, 58 from France, 57 from Holland, 53 from Luxemburg, 47 from Greece, 40 from Turkey, 33 from Italy, 32 from Scandinavia, 23 from Spain, 19 from Belgium, 9 from Portugal, and 5 from Denmark. From America, mainly from the United States, are 302; from Asia, chiefly Japanese, 113; from Africa, 13; and from Australia 6. The distribution of this foreign element at the universities is as follows:—

University	Foreign students		University	Foreign students	
	Number	Per cent.		Number	Per cent.
Berlin ...	1189	14.5	Giessen ...	84	7.6
Leipzig ...	662	14.8	Breslau ...	77	3.9
München ...	496	8.8	Würzburg	67	4.7
Heidelberg	259	16.1	Marburg	60	4.9
Halle ...	254	11.3	Tübingen	59	3.9
Jena ...	186	14.6	Greifswald	43	5.2
Göttingen	169	9.2	Erlangen	28	2.6
Freiburg	164	9.4	Rostock ...	13	2.0
Königsberg	134	11.7	Kiel ...	12	1.4
Strassburg	96	5.8	Munster ...	11	0.7
Bonn ...	88	2.9			

These foreign students are taking as their chief studies:—evangelical theology, 185; Catholic theology, 34; law, 580; medicine, 1080; philosophy, languages, or history, 951; mathematics and science, 714; agricultural sciences, forestry, &c., 573; dentistry, 24.

STANDARD ELECTRIC GLOW LAMPS.

THE report of the Engineering Standards Committee on the British standard specification for carbon filament glow lamps, which has recently been issued, is of great interest, more especially as it has been published at a time when so many important papers and discussions on carbon and metallic filament lamps are occupying the attention of men of science and engineers. The specification gives at the beginning a list of standards and definitions, and goes on to state what the committee has decided as to the tests a standard lamp shall comply with. A lamp of 12 candle-power is suggested in addition to the usual 8, 16, 25, and 32, and this should prove a very useful size; although it has already been used, it has not been kept as a stock lamp usually. The standard lamps are to be divided into two classes, having a useful life of 400 and 800 hours respectively, and all lamps purporting to be British standard lamps are to be marked with the trade mark or name of manufacturer, the standard mean horizontal candle-power, the voltage, and a reference letter in a circle, which is to show which class—whether 400 or 800 hours—the lamp is intended for. This reference letter is, we think, a mistake, as the ordinary consumer will not know to what it refers, and we do not see the objection to marking plainly on the lamp the useful life hours. The insulation resistance between cap and filament seems to us to be rather high (1000 megohms). The limits for mean horizontal candle-power and total watts, on the other hand, allow plenty of margin, but doubtless these will be reduced after the standards have come into force, which we understand they will do in July next. At present, however, we do not see that the ordinary consumer will benefit very greatly by the specification when it does come into force, for, as we pointed out a few months back, unless the borough councils or local authorities erect special testing laboratories where tests on lamps can be carried out by an expert for a very small fee, or even free of cost, the ordinary consumer will be in practically the same position as he is at present. Of course, the fact of his being able to ask for a standard lamp may tend to make the article sold him slightly better, and with truer candle-power and consumption figures marked on; still, we are afraid that, from the consumer's point of view, until he can get his lamps tested locally, not very much improvement will be seen. The report is, however, of very great interest to those connected with that branch of the electrical profession, and is certainly a long step in the right direction.