

### A Neglected Correction in Osmotics.

IN the dynamic method of determining relative vapour pressures, air, initially dry, is passed first over the solution and then over the pure solvent. When it leaves the solution it has taken up a quantity of solvent vapour  $l_1$ ; on leaving the solvent it contains a further quantity,  $l_0 - l_1$ . While working on aqueous solutions at  $0^\circ \text{C}$ ., Mr. Hartley and I had realised that the air when over the solution expands by an amount represented by the vapour pressure of the solution, similarly a further expansion takes place over the solvent, but as this further expansion is only that due to the difference of vapour pressures of the two liquids—say  $1/10$ th of 4 mm. Hg—we had assumed that this small quantity was negligible in comparison with the total pressure.

Dr. C. V. Burton, of my laboratory, has pointed out to me that this assumption is not justified when osmotic pressures are to be calculated from the observed results. His discussion of the necessary correction is as follows. Let  $B$  be the barometric pressure and  $V$  the volume of air (measured when dry) passed through the system. The air in contact with the solution has a partial pressure of  $B - \pi$ , and the volume now occupied by it is increased to  $VB/(B - \pi)$ . Similarly, on leaving the solvent the volume has become  $VB/(B - \pi_0)$ . If  $\rho_1$  and  $\rho_0$  are the densities of the vapour in equilibrium with the solution and solvent respectively, the masses  $l_1$  and  $l_0$  are  $\rho_1 VB/(B - \pi)$  and  $\rho_0 VB/(B - \pi_0)$ .

Assuming that Boyle's law holds good for the vapour up to  $\pi_0$ , with sufficient accuracy for the purpose of the correction, we can replace  $\pi$  by  $\pi_0 \rho_1/\rho_0$ . We have then what amounts to a simple equation in  $\rho_0/\rho_1$ ; its solution is  $\rho_0/\rho_1 = l_0/l_1 - \frac{\pi_0}{B} \left( \frac{l_0}{l_1} - 1 \right)$ .

In the value deduced for the osmotic pressure,  $\log_e(\rho_0/\rho_1)$ , enters as a factor, and the corrected value of this factor is  $\log_e(l_0/l_1) - \log_e \left[ \frac{\pi_0}{B} \left( \frac{l_0}{l_1} - 1 \right) \right]$ .

The correction for a solution at  $0^\circ \text{C}$ ., the osmotic pressure of which is 132 atmos., is  $-0.84$  atmos., and for one the osmotic pressure of which is 41 atmos. it is  $-0.26$  atmos.

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### Chemistry and Industry.

IN his admirable article in NATURE of February 18 under the above heading, Prof. Jocelyn Thorpe dealt in a very concise manner with the grave difficulty which must seriously hamper all the present efforts to establish chemical industries in this country in successful competition with Germany. Particularly his remarks that the scientific worker has found by sad experience that little financial profit accrues to him even though he goes to the trouble of obtaining patent protection for his discovery, are of interest.

In this country, when an inventor applies for patent protection, a novelty search is made by the Patent Office in respect of his invention, solely among British patent specifications published before the date of his application during a period of fifty years. In contradistinction thereto the examiners at the German Patent Office investigate all printed publications of the last one hundred years prior to the date of such application. These publications include not only German patent specifications, but patent specifications and text-books of every country in the world. The applicant's attention is directed to any prior publication or text-book dealing not only with the particular subject but containing even remote suggestions that may lead up to that particular discovery.

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Now, while this somewhat gigantic problem of the German Patent Office cannot in all cases be efficient and free from fallacy, it is, nevertheless, quite clear that the result of such a search must in a large number of cases be of greater value than that of the limited search carried out by the British Patent Office. In this manner, therefore, the inventor, if his discovery is found novel and patentable in Germany, has not only the satisfaction of having his invention tested quasi from an international point of view, but what is more valuable to him, he has his attention directed to knowledge existing and discoveries made also outside his own country.

Due to this wide scope of the official search, apart from other stringent considerations connected therewith, fewer patents are, of course, granted proportionately in Germany than are granted in this country, and it would, indeed, be interesting to examine how many of the discoveries for which patents have been granted in this country, for instance, in respect of aniline dyes, have, in fact, been protected also in Germany. A number of these British patents on which royalties are probably being paid, or will be paid in the near future, would, perhaps, not stand a test before our courts, since prior text-books or a prior foreign specification may be relied upon in an action before a British Court, while the Comptroller-General of Patents has no right to consider such publications before granting a patent.

I have heard it argued that our limited search was good enough, because if there was anything worth patenting anywhere, it would certainly be patented in this country. I venture to suggest that this is as much an antiquated idea as prevailed, until this war opened our eyes to the present industrial situation, with regard to the industrial supremacy of these islands shortly after the time when Section 27 of the Patents and Designs Act of 1907 was called into being. In this connection it is interesting to recall a famous phrase uttered by Mr. Justice Parker (now Lord Parker) in his decision in the matter of the revocation of Hatschek's patents, Nos. 6455 of 1900 and 22,139 of 1900, viz. :—"However great may be one's belief in the industrial supremacy of the inhabitants of these islands, it would at least be somewhat arrogant to assert that wherever the manufacture of a patented article in the United Kingdom is less than one-half of the total manufacture of the whole world, there arises a presumption that British trade has not had fair play."

The decision involved a matter of great importance to patentees, manufacturers, and British traders, and it was justly stated that the whole industrial world was anxiously awaiting the dictum on that famous section of the Act.

The greatest anxiety, of course, prevailed in Germany, and this was natural in view of the many British patents taken out by German chemists and chemical concerns for the purpose of blocking the industry in this country rather than of developing it.

Now, why has that section failed to do that which it was actually framed for? To my mind there are several important reasons. The average manufacturer does not possess the knowledge that chemical manufacture cannot in these times be carried on without his close co-operation with highly trained chemists, and, true to old-established tradition, he is prejudiced to any such co-operation. Further, he is constantly faced by the danger of infringing existing British patents, and even though he may be aware that the patents blocking his way are mere "paper" patents and that he has every reasonable hope to succeed in an action for infringement or revocation thereof, the exceedingly high cost at present connected with any action must have an important effect on his hesitant