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# On the diffusion of vapours through clay cells

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## ON THE DIFFUSION OF VAPOURS THROUGH CLAY CELLS.

BY DR. J. PULUJ.

The apparatus for the experiments in this investigation consisted essentially of a clay cell enclosed in a tin-plate box, and connected with a cooling-apparatus and a vertical glass tube. A moderate current of air passed through the box, while the vapour flowed into the cell, and, striking past at the walls of it, diffused reciprocally with the air in the box. The surplus vapour, as well as the air that had diffused through, passed into the cooling-apparatus, where the former condensed, and the air, saturated with vapour at the temperature of the room, flowed into the glass tube. The volume of this air was measured by means of soap-films or very thin disks of mica suspended by soap-water in the tube, by which the pressure could be preserved equal on the two sides of the cell. The outflowing air from the box passed through an absorption-apparatus, the increase in weight of which consequently gave the quantity of vapour that had diffused through in a fixed time; and from this the volume of the vapour was calculated. Two series of experiments, carried out with steam between  $123^{\circ}8-145^{\circ}3$  and  $136^{\circ}6-144^{\circ}9$  C., gave the result, that, *while the ratio of the volumes of the transdiffused air and vapour remains constant and is almost exactly equal to the square root of the reciprocal value of the vapour-density, the velocity of the diffusion increases with the temperature.* Experiments with the vapours of alcohol and ether gave for this ratio somewhat higher values than the numbers calculated from the theoretical vapour-densities. The deviation which had been already observed from Graham's law is not of equal amount in the case of every vapour; and the author makes it appear not improbable that the forces acting between the molecules of substances and their vapours, which with some vapours are even more striking, may modify the square-root ratio, and that a case would not be inconceivable in which a vapour of greater density would diffuse through a porous plate more rapidly than one of less density, as is the case with absorbent films of liquid—a reversal of the diffusion-ratio which has also been observed in the osmosis of liquids.

*Meanwhile it is to be regarded as certain that the vapours investigated diffuse through clay cells in nearly the inverse ratio of the square root of their densities.*

In the appendix to his memoir, the author discusses Dufour's experiments on the diffusion of dry and moist air through porous plates, demonstrates the inadmissibility of Dufour's assumption that *dry air diffuses more rapidly than moist* of which the density is less than that of the former, remarks that certain experiments made by Dufour himself must be left unexplained by that assumption; and, starting from the presupposition of the result obtained from the experiments he has described, *that aqueous vapour diffuses more quickly than air*, gives a complete explanation of the experiments of Dufour.—*Sitzungsb. der k. Akademie in Wien, math.-naturw. Classe*, 1877, No. vii. pp. 69–71.