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On the Absorption of Water by Cotton and Wool.

By Morris W. Travers, D.Sc., F.R.S., Director of the Indian Institute of Science, Bangalore.

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In a footnote to my paper entitled "The Law of Distribution where one of the Phases possesses Mechanical Rigidity,"* I attempted to show how the results obtained by Professor Trouton† for the absorption of water vapour by cotton could be reconciled with those obtained by me in the case of similar systems, such as carbon dioxide and amorphous carbon. As the apparatus I had employed in the investigation referred to was particularly suited to the accurate measurement of low pressures, I obtained Professor Trouton's permission to repeat his work, and to investigate the relationship of pressure and concentration for the systems water-cotton and water-wool at the temperature of melting ice.

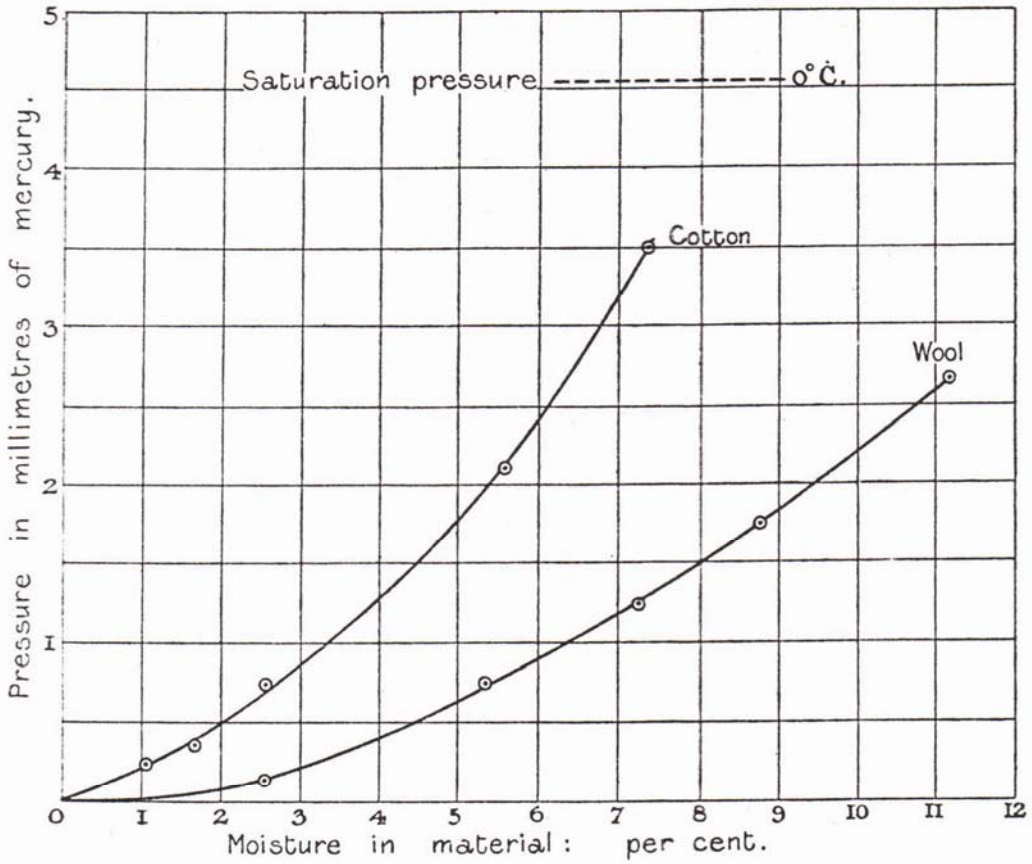
I was particularly anxious to redetermine the lower portions of the curves, for as in Professor Trouton's experiments the material was dried at the air temperature, it appeared probable that it contained water at the commencement of the experiment, and that the true origin of his curves lay further to the left than the results appeared to show. If this were the case, the true curve representing equilibrium in the system water-cotton might closely resemble those representing equilibrium in the system carbon dioxide and amorphous carbon.

The measurements were made by means of the apparatus described in the previous paper.‡ About 10 grammes of cotton or wool was contained in the bulb *a*, which formerly contained the amorphous carbon, and to the bottom of the bulb was sealed a tube connected with an arrangement such as was described by Professor Trouton, for admitting successive quantities of water. The apparatus was connected through a large tube containing pentoxide of phosphorus with a Töpler pump and, after exhaustion, the bulb containing the wool or cotton was maintained at the temperature of boiling water for four hours, so as to remove all traces of moisture from the material. The methods of manipulation and of making the observations have already been described.

The results are shown on the accompanying curves. It appears that in

* 'Roy. Soc. Proc.,' A, vol. 78, p. 9.
† 'Roy. Soc. Proc.,' A, vol. 77, p. 292.
‡ *Loc. cit.*, p. 11.

neither case do the curves exhibit any tendency to bend to the right, as do those representing the results of Professor Trouton's experiments. Experimental difficulties prevented me from extending them further.



I have already expressed the opinion that the absorption of vapours by amorphous substances involves the formation of solid solutions, though, since amorphous substances are not physically distinct from liquids, the term "rigid" solution would be more exact. Crystalline solids would only absorb, in the strict sense, the vapours of substances which, in the solid phase, were isomorphous with them; and if they exhibited absorptive power towards other substances it might be set down to surface condensation or to chemical action.