this thickening was that it was almost impossible to seal the tubes up without the danger that the points might crack on cooling. Amongst the first tubes that were used this was a constant occurrence, but it was completely obviated by the aid of the blowpipe. The crack as a rule was confined entirely to the point, and as Mr. Buchanan found that after some days the contents of one of the cracked tubes were still at a pressure of less than one-half of that of the atmosphere, the tubes were preserved, and when they came to be opened years afterwards, their contents were still found at a pressure of from one-third to one-half of that of the atmosphere, and the analysis of their contents did not indicate any contamination with atmospheric air.[1]

In the analyses of the samples Mr. Buchanan used Doyère's apparatus,[2] for which he was indebted to the kindness of Dr. Edmund Ronalds of Bonnington. Professor Dittmar used a modification of this method, which he has fully described in his Report. Although it was unlikely that anything besides carbonic acid, oxygen, and nitrogen would be found in the gases, both Professor Dittmar and Mr. Buchanan tested the nitrogen remaining from the gas extracted out of a bottom water for combustible gas, but with negative results.

That water may be kept even under somewhat difficult circumstances without changing its atmospheric contents is shown by experiments with water taken from 400 fathoms in the North Pacific on 5th July 1875. The stopcock water-bottle was sent twice to that depth. From the first collection a flask was filled immediately and at once boiled and the gases collected and preserved. The contents of the second water-bottle were run carefully into a bottle with the same precautions as when running it into the gas flask, and it was closed with an india-rubber cork, through which a short glass tube with capillary opening passed. As the water when collected was colder than the atmosphere, it was able to expand and overflow through the capillary tube, but no circulation could take place. Next day 900 c.c. of this water were siphoned off into the gas flask and boiled, the gases being collected and preserved. The gases from the first sample were analysed by Mr. Buchanan, those from the second by Professor Dittmar.

The values were :—

[1] In connection with leakage through cracks, the following observation is of interest. Some years ago I had occasion to have a flask of about a litre and a half in capacity very perfectly evacuated and hermetically sealed, containing about 50 c.c. of distilled water perfectly freed from air. On going into my laboratory one morning, I was struck by a sound like the singing of a kettle at some distance, and it was a little time before I traced it to the flask, which I then found had cracked, the crack taking the form of a star about half an inch in diameter. As the crack was in the bottom of the flask it was completely covered by the water in it. Through a point in one of the radii of the crack the air was entering and passing through the water in a continuous stream of minute bubbles, each of them not larger than a pin's head. It was this stream of air-bells which caused the noise or note which, though low, was very penetrating. As the air was entering in a visible stream, I was somewhat surprised to find that at the end of the day there was no apparent relaxation, and I was much interested to find it still going on the next morning. For fifteen days I watched it rushing in without intermission, and being obliged to go from home I opened the flask under water, which immediately rushed in, and more than half filled it. The amount of air which had passed did not weigh more than 1 gramme, yet it produced a continuous sound for fifteen days. J. Y. B.

[2] Ann. Chim. Phys., sér. 3, t. xxviii. p. 1.