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Chemistry. — “*Investigations on the radium content of rocks.*” II.
By Dr. E. H. BÜCHNER. (Communicated by Prof. A. F. HOLLEMAN).

As a second contribution to the knowledge of the radium content of the earth's crust,¹⁾ I now wish to communicate the results of the measurements of a few sedimentary rocks. I may refer to my previous paper for particulars about the method of investigation; only the way, in which the substance was brought into solution, may be briefly exposed. It was much shorter than in the case of igneous rocks, because the investigation has been limited to rocks which dissolve for the greater part in dilute hydrochloric acid. I took, as usual, twenty-five grammes of the finely powdered rock and dissolved, gently heating, in 250 c.c. dilute hydrochloric acid. A usually small residue was left, which, after having been separated from the solution, was fused with a little sodiumcarbonate. Leaching with water gave a solution, in which in all cases sulfuric acid could be detected. The presence of radium being hereby excluded, I rejected this liquid, and dissolved the very small residue of carbonates in a few drops of hydrochloric acid. This solution was mixed with the main solution, which then was measured in exactly the same manner as described in my previous paper. During the course of the measurements I have for the sake of security regauged the electroscope, using the radiumbromide solution of Professor RUTHERFORD; I obtained exactly the same value as formerly.

The investigation concerns four samples of marble, six of limestone, chosen from different geological periods and one of chalk; fresh specimens of the rocks were supplied to me by Dr. F. KRANTZ of Bonn.

The results are given in the following table, in which the figures relate to the quantity of radium per gramme of rock, expressed in 10^{-12} grammes

Marble	Carrara	1,3
„	Piasco, Valle del Po	1,6
„	Auerbach, Bergstrasse	1,7
„	Villmar, Nassau	0,8
Limestone, silurian	Kuchelbad, Prag	0,7
„ carboniferous.	Ratingen, Düsseldorf	4,3
„ trias	Jena	0,4
„ lias	Vaihingen, Württemberg	2,1
„ lower chalk	Egestorf, Hannover	0,3
„ eocene	Paris	0,8
Chalk diluvial	Pietersberg, Maastricht	1,5

¹⁾ These Proceedings XIII, 359 (1910).

It is seen, that, if we disregard the sample from the carboniferous formation, the numbers do not differ much, at least less than was found for igneous rocks. We do not observe either any relation between radium content and geological age: the figures in the table are distributed arbitrarily. The same holds for the four specimens of marbles; the two first are geologically more recent than the last, but a corresponding difference in the quantity of radium present is not to be found. The general mean of the above numbers is 1,4 and agrees fairly well with the mean, which can be calculated from different (in all ten) values, given for limestone by STRUTT ¹⁾, EVE ²⁾, COLERIDGE FARR and FLORANCE ³⁾, SCHLUNDT and MOORE ⁴⁾ and which amounts to 1,3. On the contrary a much higher mean of 3,3 would follow from JOLY's ⁵⁾ data, which relate to twelve rocks of this kind. We cannot yet settle the question, whether this difference must be ascribed to chance or is caused by the small deviations between the methods of determination. In this connexion, though, I must draw attention to the fact that JOLY, measuring a limestone from Vailingen obtained the value 3,0, while in my table the number 2,1 is found; this would tend to make influence of the method of working more probable.

In conclusion I would like to make a remark on the often expressed opinion that sedimentary rocks contain generally less radium than igneous ones do. As a matter of fact, the mean of all sedimentary rocks measured is less than that of the igneous, but, if we divide the last into groups, it becomes evident, that this difference is only caused by the high radium content of the granites, whilst the fact, that an especially great number of samples of this rock have been measured, tends to make the general mean higher. If we calculate e.g. the mean of the ten results, obtained by FARR and FLORANCE and by FLETCHER ⁶⁾ for trachyte, we obtain 1,0, a lower value than that given above for limestone. Such a result will probably be also obtained for other igneous rocks; I hope to return to this subject later on, after having measured further samples of these rocks.

Inorg. Chem. Laboratory University of Amsterdam.

¹⁾ Proc. Roy. Soc. A **78**, 150 (1906).

²⁾ Phil. Mag. [6] **14**, 231 (1907).

³⁾ Phil. Mag. [6] **18**, 812 (1909).

⁴⁾ U. S. Geological Survey, Bulletin 395 (1909).

⁵⁾ Radioactivity and geology, London 1909, p. 60.

⁶⁾ Phil. Mag. [6] **20**, 36 (1910).