On an anomalous Electric Condition of Iron. By MARTYN I. ROBERTS, Esq.

It is now some months since, that while prosecuting a series of novel galvanic experiments, I discovered a singular anomaly in the electric condition of iron, which is, that although iron if associated with copper as a galvanic pair is highly positive to the copper, yet when associated with zinc, it is more highly negative to the zinc than copper would be under similar circumstances; or in other words, that although copper and iron form a galvanic combination, in which the iron is in the same relation to the copper that a zinc plate would be, yet that iron and zinc form a galvanic pair that has a greater power of generating electric action than a similar sized pair of copper and zinc. This singular phenomenon will, I believe, lead the way to some important discoveries; but not to occupy too much space in your valuable Journal, I will without further comment give extracts from my note-book of some experiments made by me on this subject.

Jan. 1st, 1839. A galvanic combination of iron and zinc was put in communication with two poles of a differential galvanometer; a like-sized combination (or gal. pair) of copper and zinc was connected with the other two poles of the diff. galvanometer: Deviation of needle in favour of the iron and zinc pair = 25 degrees.

Feb. 27, 1839. Experiments made on the comparative power of two galvanic batteries fitted up on Wollaston's plan (that is with the negative plate opposed to both surfaces of the zinc or positive plate.) The size of the plates was the same in both batteries, viz. zinc plate $2\frac{1}{2}$ inch. by $2\frac{1}{2}$ inch. The number of pairs in each battery was ten. The only difference between the two batteries was, that the negative plates in one were of copper and in the other of iron.

The exciting solution was dilute sulphuric acid, which was not renewed during the experiment, but the experiment was continued until the acid was exhausted. The power of each battery was applied to the decomposition of water, and the gas collected was the measure of the power.

RESULTS.

Battery of Copper and Zinc.

The first cubic inch of gas obtained	in 33 minutes.
Then one half cubic inch "	in 92 minutes.

Acid was now exhausted. $1\frac{1}{2}$ cubic inch in 125 minutes.

Battery of Iron and Zinc.

First cubic inch obtained	in 7 minutes.
Second " "	in 9 minutes.
Third " "	in 26 minutes.
Fourth " "	in 62 minutes.

Acid now exhausted. 4 cubic inch. in 104 minutes.

Iron battery with a measured quantity of acid gave 4 cubic inches in 104 minutes.

Copper battery with a like quantity of acid gave only $1\frac{1}{2}$ cubic inch in 125 minutes.

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