

V.—*On some Thermo-electrical Properties of the Metals Bismuth and Antimony when used as single elements.*

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I wish to shew that when bars of bismuth are cast so as to break with a smooth cleavage surface, or with a granular surface, they possess different thermo-electrical properties. Also that bars of antimony, under similar treatment, partake in a lesser degree of the same character.

Square bars of bismuth 7 inches long by $\cdot 15$ of an inch square, were cast in a brass mould which opened along two of the opposite diagonal edges of the bar to admit the removal of the casting.

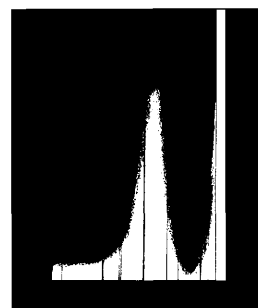
Bismuth cast in this mould, previously heated to the melting temperature of the metal and slowly cooled, broke with a fracture which presented a large shining surface; and when cast in the mould cold, the fracture of the bars presented a surface similar to some of the common varieties of cast iron. It was with these two classes of bars that I obtained the different results noted in the experiments.

Antimony bars were prepared in like manner, but the fracture of those cast at the highest temperatures was never free from the effect produced by the chilling of the sides of the mould.

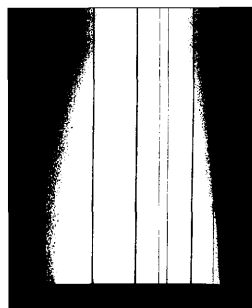
The results are arranged in the following table. The signs + — are put opposite the bars when they were negative or positive, according to the direction in which the heat was made to cross the joint.

First Bar.	Sign.	Second Bar.	Sign.	Description.
Bismuth, cast of large grain	+ —	Bismuth, cast of large grain	+ —	This was a bar broken in two, the surfaces for contact being slightly rounded with a file. Heat and electricity crossed the joint in the same direction.
Bismuth, cast of small grain	+ —	Bismuth, cast of small grain	+ —	This was a broken bar; the broken surfaces for contact being rounded. Heat and electricity crossed the joint in opposite directions.
Bismuth, cast of large grain	+ —	Bismuth, cast of small grain	+ —	Heat and electricity crossed the joint in the same direction.
Antimony, large grain	+ —	Antimony, large grain	+ —	This was a broken bar; the broken surfaces rounded. Heat and electricity crossed the joint in the same direction.
Antimony, fine steel-like fracture	—	Antimony, fine steel-like fracture	+ —	These were two separate castings. The direction of the flow of heat across the joint did not govern that of the electrical current generated.
Antimony, large grain	+ —	Antimony, fine steel-like fracture	+ —	Separate castings. Heat and electricity crossed the joint in the same direction.

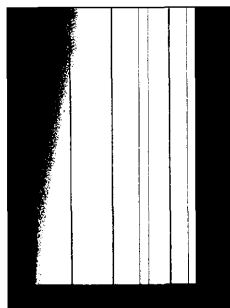
When a thin leaf of bismuth was nipped between the two antimony surfaces, heat and electricity immediately crossed the joint in opposite directions.



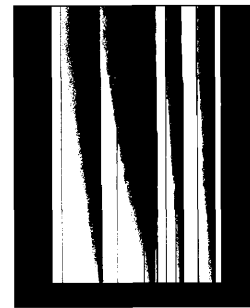
H G d f b e D B

VII. *Molybdenous Chloride*

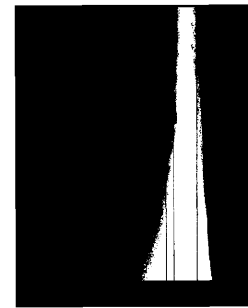
G F b e D B

VIII. *Ferricyanide of Potass*

G F b e D B

IX. *Chromate of Copper*

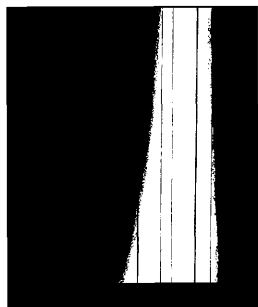
H G d F b e D B

X. *Alr° Cobalt Salt*

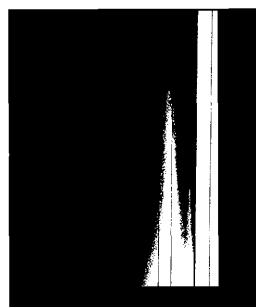
F b e D

XI. *Aqueous Cobalt Salt*

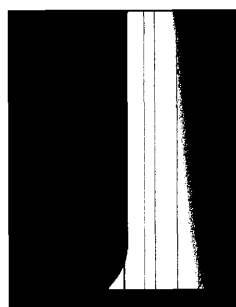
F b e D R

XII. *Permanganate of Potash*

F b e D B

XIII. *Copper Salt*

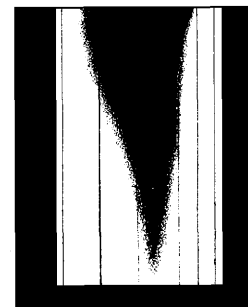
b e D B

XIV. *Ferric Sulphocyanide*

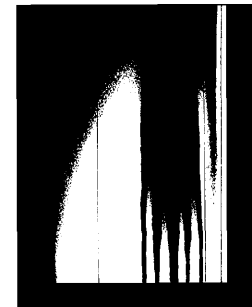
F b e D B

XV. *Dilute Ferric Sulphocyanide*

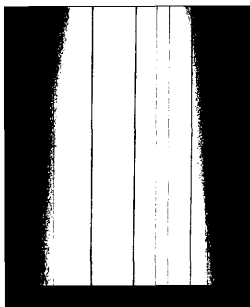
H G d F b e D

XVI. *Ferric Meconate*

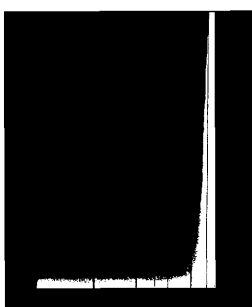
H G F b e D B

XVII. *Ferric Comenamate*

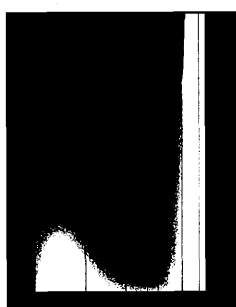
G F D B

XVIII. *Ferric Comenamate*

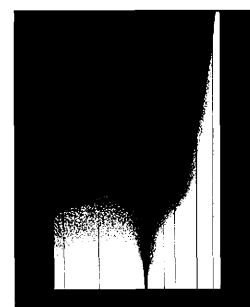
H G F b e D B

XIX. *Chromate of Potash*

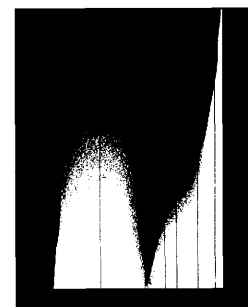
G F b e D B

XX. *Dichromate of Potash*

G F b e D B

XXI. *Neutral Litmus*

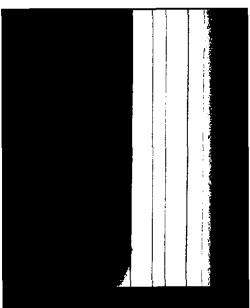
H G F b e D B

XXII. *Alkaline Litmus*

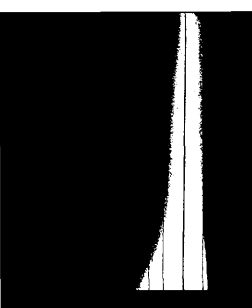
G F b e D B

XXIII. *Boracic Acid Litmus*

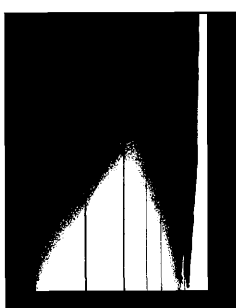
G F b e D B

XXIV. *Acid Litmus*

F b e D B



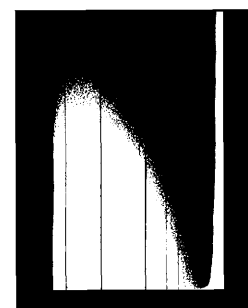
b e D B



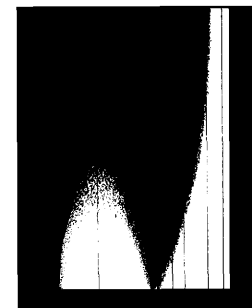
G F b e D



G F b e D B



H G F b e D



G F b e D B