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Exothermic steel

Joseph William Richards

"Exothermic" Steel.

To the Editor of Metallurgical and Chemical Engineering:

SIR: Mr. Amsler in your November issue says in his letter that: "If any critic will submit a better chemical explanation of the matter than the one given it will be thankfully acknowledged;" also that: "Constructive criticism will be welcomed." I accept both invitations.

In the original article on "Exothermic Steel" in your September issue it is stated that: "A quantity of iron ore and flux was mixed in a No. 4 graphite crucible, which was then placed in an ordinary cast-iron 'cannon-ball' stove and well

packed in coal. After about fifty minutes the crucible was removed to find the molten iron separated out under a cover of fluid vitreous slag." The flux referred to was feldspar, bauxite and limestone with no carbon, and the experiment is supposed to prove the *reducing* action of this flux. I have already characterized this supposition as unbelievable. I prefer to believe that the carbon of the graphite crucible containing the mixture is one reducing agent which Mr. Amsler has ignored and the white-hot carbon monoxide atmosphere in which the crucible is immersed (it was "well packed in coal") provides another reducing agent which must not be overlooked. These two supply all the reducing action necessary to explain the reduction of the iron ore without assuming in regard to feldspar flux that it acts reducingly and exothermally like free aluminium.

Since "matte" is a melted sulphide, mostly of copper and iron, Mr. Amsler should not use this term for an entirely different product. He should at once abandon the term "matte" in connection with his furnace, because he has no right to use it as he does. Let me suggest as a more appropriate name, "smelting" furnace, and for the product, "sponge." These may not be acceptable to Mr. Amsler, but he owes it to his standing as a metallurgist to drop at once his misuse of the term "matte."

As to the product, it certainly looks like "good stuff"; so good that it is a pity it should have had such a misnomer as "Exothermic Steel" tagged on to it and also a greater pity that it should have been heralded by such a sorry apology for a scientific explanation of its reason to exist. I herewith offer the only one which at present appears to me as reasonable, namely, that good ore is used and pure fuel and that the cleansing influence of a rather expensive but very efficient feldspar flux is responsible for the rest. I believe that a light, fluid, clean slag, capable of absorbing and holding the various metallic oxides and compounds which usually contaminate the fluid steel may have very striking effects on the quality of the metal. I think that any open-hearth steel would be improved by using some feldspar flux just as it is known to be improved by using fluorspar.

If anyone has better explanations than those offered above I shall be interested to hear them.

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