1907

Water Gas

Joseph William Richards

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To the Editor of Electrochemical and Metallurgical Industry:

SIR:—In your January issue is a translation by Dr. Nagel of Baron Jüptner's article on water gas, taken from the latter's "Chemische Technologie der Energien." This letter is written not to criticise the translation, which is well made, but to criticise two glaring errors in the original which remain

unchanged in the translation, and which shall be corrected here.

When carbon burns to CO^2, 97,600 Calories are generated per 12 kg. of carbon burning (we agree with Jüptner); when molecular weight of CO (containing 12 kg. of carbon) burns to CO^2, 68,700 Calories are evolved (we agree again with Jüptner); but when 12 kg. of carbon burns to CO, Jüptner says that 21,100 Calories are evolved, whereas, from his own figures, just given, and with which we substantially agree, there is evolved 97,600 — 68,700 = 28,900 Calories.

Jüptner should have used 28,900 instead of 21,100, to have his figures consistent with each other; I prefer a slightly different value, 29,160, which is 0.9 per cent higher, but there is no shadow of doubt that the figure 21,100 is some 8,000 Calories below the correct figure, an error of 28 per cent.

The second error is that Jüptner takes 69,750 Calories as the heat of formation of a molecule of steam or water vapor, whereas, this is the heat of formation of molecular weight of liquid water. When steam is passed over incandescent carbon, *steam* is the thing decomposed, and not liquid water, and, therefore, the heat of formation of water vapor, which is 58,060 Calories, is to be supplied per molecular weight of steam decomposed. Jüptner's figure is therefore 11,690 Calories too high, an error of 20 per cent.

The fundamental equation of the production of water gas being $C + H^2O = H^2 + CO$, and Jüptner having erred 20 per cent on one and 28 per cent on the other of the heat quantities involved, we can infer that no value at all attaches to his discussion of the thermochemistry of this reaction.

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