XLIV.—*On the Occurrence of Nickel in Lead, and its Concentration by Pattinson's Process.*

By WM. BAKER, Associate of the Royal School of Mines.

It is well known that, for certain manufactures, lead of a high degree of purity is required. The presence of a very small amount of copper is especially injurious for making white lead and glassmakers' red lead. Investigating the cause of a peculiar tint in glass, which was sometimes sufficiently marked to be called blue, and was readily accounted for by the presence of copper, I sought carefully for cobalt, but only found nickel. In all the samples of English lead which I have examined I have never detected a trace of cobalt. On the contrary, traces of nickel have frequently been found in various samples of Derbyshire lead, in Yorkshire lead, and lead from Snailbeach. Operating upon 2000 grains, I have found the following quantities of nickel in the pig lead as delivered by the smelter :—

			oz.	dwt.	gr.	
Derbyshire lead, 1st sample. . . .	0·0023	% = 0	14	8		per ton.
Do. 2nd „	0·0031	„ = 0	19	14		„
Do. 3rd „	0·0023	„ = 0	14	8		„
Snailbeach lead	0·0007	„ = 0	5	10		„
Softened slag lead.	0·0057	„ = 1	16	14		„

378 BAKER ON THE OCCURRENCE OF NICKEL IN LEAD.

On submitting lead containing these quantities of nickel to Pattinson's process, I find a concentration of the nickel in the fluid portion. Crystals of lead were taken out in the proportion of $\frac{9}{10}$, leaving $\frac{1}{10}$ fluid lead of a 5-ton charge.

Samples of the fluid lead or "bottoms," upon analysis, contained nickel as follows :—

		oz.	dwt.	gr.	
After 3 crystallisations	0·0047	= 1	10	1	per ton.
After 1 do.	0·0043	= 1	7	10	„
After 1 do.	0·0062	= 2	0	12	„
After 2 do.	0·0072	= 2	7	0	„

In all cases a weighable quantity could be obtained from 2000 grains of lead.

Five tons of lead contained $\cdot 0068\% = 2$ oz. 4 dwts. 10 gr. per ton. Four and a half tons were removed as crystals, and when melted contained only $\cdot 0047\% = 1$ oz. 10 dwts. 1 gr. per ton. These figures show that nickel remains to a great extent with the fluid portion, much as copper does; and I have reason to suppose that when it reaches a certain amount, as is the case with copper, the separation is no longer effected, or only in a very small degree. In the case of copper this is easily understood, when it is seen that, at a low temperature, copper (in the absence of antimony and arsenic) will separate and be found in the dross on skimming, leaving the fluid lead, containing about 20 oz. per ton = $0\cdot 06\%$. To effect a separation of the copper by Pattinson's process, the amount at the commencement should not be more than 10 oz. per ton.

A sample of lead from 5 tons, when analysed, gave no indications of the presence of nickel; on crystallizing $\frac{9}{10}$, the remainder gave distinct traces of the metal. In refined lead, I have only once succeeded in obtaining a weighable quantity, and only rarely found traces of nickel. That it is not removed by oxidation is proved by the larger quantity found in the fluid portion of the lead when crystallized, as well as by the fact that in the softened slag lead which is submitted to the powerful oxidizing action of nitrate of soda, a considerable quantity of nickel is still found.