EXTRACTION OF IRON FROM COPPER ENRICHMENT PLANT WASTE

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ABSTRACT

The article presents the results of research on the technology of extraction of ferrous metals from concentrator waste. Accordingly, based on the analysis of local and foreign literature on the processing of concentrators, the classical pyrometallurgical and hydrometallurgical technologies for the separation of iron and its compounds from the waste were studied and their advantages and disadvantages were identified. Copper production has been shown to generate large amounts of oxidized waste during flotation enrichment of sulfide copper-molybdenum ores and after magnetic enrichment of iron ores. Chemical analysis of the waste showed that it contained large amounts of oxidized iron compounds.

Key words: *Copper, waste, concentrate, flotation, slag, coke, solution, cake, sulfuric acid, leaching, charge.*

INTRODUCTION

In our republic, the mining and metallurgical industry, the creation and implementation of new innovative and improved technologies for complex extraction of all precious metals using polymetallic ores are being achieved.[1] In this regard, scientific research aimed at the creation and improvement of new technologies for the complete and pure extraction of precious metals from the processed electrolytic solutions of copper production waste sludge products of JSC Almaliq mining metallurgical combine is of great importance [2] If we take stone from the man-made waste produced every year, more than 650 thousand tons of stone are thrown into landfills in liquid form. If it contains 0.6-0.9% copper, 30-40% iron, 0.2-0.3 g/t gold, 0.6 g/t silver, 0.5 g/t palladium, metals such as selenium, tellurium, rhenium, and indium are also present.[3] For this purpose, the urgency of the task is determined by developing a method for extracting copper and rare metals using alternative factors of rock processing. In addition, 210-230 thousand tons of converter slag is produced at the copper smelter every year. In the 2nd MBF, about 180,000 tons are processed by the flotation method. [4]

Composition of substances in CCP-2 waste. Table 1

Com-ponent	Al	Si	Ti	V	Mn	Fe	Cu	Zn	Pb	Co	Mg
Amount	5,08	25,2	0,294	0,009	0,313	52,6	0,871	2,1	0,535	0,119	1,4

Due to the high content of iron in the waste and the fact that iron is found in various forms during the processing of waste from a copper enrichment factory, the waste is first incinerated using coal.[5] Control experiments were carried out in a laboratory furnace, i.e. a Muffle furnace, which was carried out by the process of regenerating iron oxides in man-made waste with coke or Angren coal. In the process of regenerative incineration of waste from copper enrichment plant, the temperature is 900-1000°C, the consumption of the regenerant is 25-30%, and the duration of incineration is 120 minutes.

Figure 1. Appearance of soot burned at different temperatures:
(a) 600 °C; (b) 800 °C; (c) 900 °C; (d) 1000 °C

For further research, 6 waste samples with minimum, intermediate and maximum reduction levels were selected and experimented. These samples were subjected to additional grinding and magnetic separator in a laboratory mill. The obtained high-grade iron product was sent to receive alloys. The experiments were conducted with the consumption of the reducing agent at 15, 20, 25%, the burning duration at 90 minutes, and the temperature at 900-1000°C. As can be seen from the picture below, the physico-mechanical properties of soot after burning at 1000°C are better, such as surface density, good strength and high antioxidant capacity. However, with a further increase in temperature (1200 °C), the reduced granules became sintered and semi-melted, which prevented stable operation in industrial conditions. In addition, after incineration of the reductant at 1200 ° C, it is easily oxidized when exposed to the external environment. Based on these results, a temperature of up to 1000 °C was found to be optimal. 25-30% of coal is considered sufficient. The following reactions take place during regenerative combustion.

$$3Fe_2O_3 = 2Fe_3O_4 + O_2,$$

$$3Fe_2O_3 + CO = 2Fe_3O_4 + CO_2,$$

$$3Fe_2O_3 + H_2 = 2Fe_3O_4 + H_2O,$$
$$Fe_3O_4 + CO = 3FeO + CO_2,$$
$$Fe_3O_4 + H_2 = 3FeO + H_2O,$$
$$2Fe_3O_4 + 2CO + 3SiO_2 = 3Fe_2SiO_4 + 2CO_2,$$
$$2Fe_3O_4 + 2H_2 + 3SiO_2 = 3Fe_2SiO_4 + 2H_2O,$$
$$Fe_2SiO_4 + CaO = FeO + Ca_2SiO_4,$$
$$FeO+H_2O=Fe+H_2O$$
$$FeO+CO=Fe+CO_2$$
$$C+2FeO=2Fe+CO_2$$
$$MeO+C_{Fe}=Me_{Fe}+CO_2$$
$$CO+H_2O=CO_2+H_2$$
$$C+CO_2=2CO$$

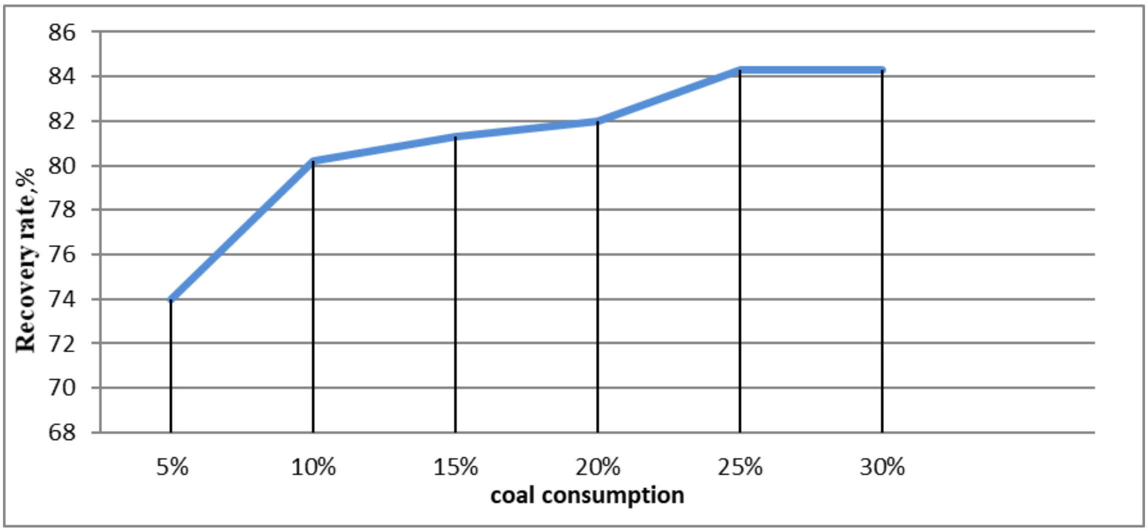

Figure 3. Effect of regenerating substance consumption on the recovery process

The influence of the consumption of the restorative substance on the recovery process Table 2

Recovery cost, %	Temperature, C	Magnetic fraction %	Non-magnetic fraction %
5	900	74	26
10	900	80,2	19,8
15	900	81,3	18,7
20	900	82	18
25	900	84,3	15,7
30	900	84,3	15,7

Conclusion: Experiments were conducted using Angren coal considering the possibility of replacing expensive imported coke with local reducing agents. Experiments show that it can be done with coal content equal to the amount of carbon in coke.

REFERENCES

1. К.С. Санакулов, А.С. Хасанов „Переработка шлаков медного производства'' Ташкент Издательство «Фан» Узбекистан 2007 г.
2. Хасанов А.С., Сирожов Т.Т., Уткирова Ш. И., Муртозаева М.М. "Исследование влияния хлоридовозгоночного обжига переработки медных шлаков" UNIVERSUM: ТЕХНИЧЕСКИЕ НАУКИ №3 (84).
3. Хасанов А.С., Толибов Б.И., Сирожов Т.Т., Ахмедов М.С. "Новые направления по созданию технологию грануляции шлаков медного производства" ЕВРАЗИЙСКИЙ СОЮЗ УЧЕНЫХ (ЕСУ). № 2 (71) / 2020
4. Сирожов Т.Т., Арипов А.Р., Уткирова Ш., Жумаев М. "Современное состояние теории и практики подготовки шлаков медного производства" Academy. № 1 (52), 2020.
5. Эшонкулов У.Х, Олимов Ф.М, Саидахмедов А.А, Туробов Ш.Н, Сирожов Т.Т., Шодиев А.Н. "Обоснование параметров контурного взрывания при сооружении горных выработок большого сечения в крепких породах" Научно-методический журнал. Достижения науки и образования. №19 Россия. 29-декабрь. 2018 года. 10-13с.
6. Ванюков А.В., Зайцев В Я. Шлаки и штейны цветной металлургии. М.Металлургия. 1969. 408 с.
7. Хасанов А.С. Физическая химия медного производства. Навои. 2003.
8. Хасанов А.С., Санакулов КС, Атаханов А.С Технологическая схема комплексной переработки шлаков Алм.ГМК. М//Известия ВУЗов. 2003.9 с.
9. Хасанов А.С. Физическая свойства жидких шлаков и штейнов II Горный вестник Узбекистана, 2004. № 3/18 С.84-85