

## UNITED STATES PATENT OFFICE

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## PROCESS FOR THE REFINING OF CHROMIUM ORES

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The present invention relates to a process for the concentration of chromium ores by treating the same at temperatures above 100° C. with alkali agents, for example, alkali metal hydroxides or carbonates, in the absence of oxygen. The process may be carried out under pressure. After the treatment and separation from the lye the ores may be subjected to a further treatment with dilute acids.

In the manufacture of chromium compounds from chromium ores the impurities, such as silicic acid, alumina, magnesia and the like, present in the gangue, often give rise to serious difficulties, since they not only consume an equivalent quantity of the material used for working up the ores, but also render the ultimate product impure and cause difficulties in working because the solutions cannot be readily filtered.

In accordance with the present invention the ore is subjected to the action of alkalis in the absence of oxygen with the result that the gangue only is attacked, so that it will be easily possible to separate the ore almost completely from the gangue without loss of chromium oxide occurring.

By this simple process inferior ores can be converted without great expense into high percentage ores, which is important not only in the manufacture of chromium compounds, but also in considerably reducing the cost of transport. Besides this, the ore subjected to this preliminary treatment is very easily worked up so that higher yields can be obtained.

As agents for partial working up alkali metal hydroxides and carbonates are suitable, employed either alone or in admixture with one another or with such substances as lower the melting point. The working up can equally well be carried out either in the aqueous phase at temperatures above 100° C. with or without increased pressure, or pyrogenically at the melting point of the operative agent used for working up the ore. The ores thus treated, are quenched in water or in dilute alkali solution, filtered and dried. The working up agent and also the alumina, silicic acid and the like can be recovered from the

filtrate in the known manner. It is likewise possible by treating the filtered, still damp sludge with dilute acids to further enrich the ore in regard to chromium oxide.

The following examples will illustrate our invention:

*Example 1.*—Finely ground chromium ore, containing for example 30% of  $\text{Cr}_2\text{O}_3$ , is mixed with the requisite quantity of caustic soda solution and heated in an autoclave in a nitrogen atmosphere to 200° C. with stirring. When the working up is complete, the ore is separated from the lye, washed with dilute acid and dried. According to the source of the raw material, an ore is then obtained containing from 55–70% of  $\text{Cr}_2\text{O}_3$ .

*Example 2.*—Finely ground chromium ore is mixed with the just requisite quantity of a mixture of sodium carbonate and sodium hydroxide and heated in a rotating furnace in the absence of oxygen to from 400–500° C. The hot melt is quenched in water, the ore is separated from the lye and dried. The lye is worked up to obtain sodium carbonate, alumina and silicic acid, while the high percentage chromium ore, thus obtained, is further worked up according to one of the customary processes.

We claim:

1. In a process for the concentration of chromium ores, the step which comprises treating an ore at temperatures above 100° C. with an alkali in the absence of oxygen.

2. In a process for the concentration of chromium ores, the step which comprises treating an ore at temperatures above 100° C. with an alkali metal hydroxide in the absence of oxygen.

3. In a process for the concentration of chromium ores, the step which comprises treating an ore at temperatures above 100° C. with an alkali metal carbonate in the absence of oxygen.

4. In a process for the concentration of chromium ores, the step which comprises treating an ore under pressure at temperatures above 100° C. with an alkali in the absence of oxygen.

5. In a process for the concentration of chromium ores, the step which comprises

treating an ore under pressure at temperatures above 100° C. with an alkali metal hydroxide in the absence of oxygen.

6. In a process for the concentration of chromium ores, the step which comprises treating an ore under pressure at temperatures above 100° C. with an alkali metal carbonate in the absence of oxygen.

In testimony whereof we have hereunto set our hands.

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FRANZ SPECHT.

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