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PROCESS FOR OBTAINING COAL PARTICULARLY POOR IN ASH CONTENT

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This invention relates to a process for obtaining coal particularly poor in ash content as required in increasing degree for various industrial purposes, especially as starting material in the production of electrodes.

The efforts made to reduce the ash content of coal to the maximum admissible for these purposes have not been completely successful till now. The usual methods according to which the coal is prepared without considering the different primary ash contents of its structural constituents may be disregarded from the outset, since the application of such methods results at best in ash contents of several percents, even if a very low yield is accepted, whereas the maximum permissible ash content of coal suited for the purposes stated must be far below 1%. It is therefore necessary to carry on the preparation along petrographic principles applying particularly to coal, which involves the elimination of those structural constituents of the coal that disclose per se a materially higher combined ash content, such as fusite containing the secondary epigenetic mineral substance, chiefly pyrite and calcite, and durite containing the secondary epigenetic clay substance, so as to effect an enrichment of the remaining vitrite and clarite portions which contain merely the primary plant ashes.

Various preparation methods have been proposed for this purpose, as the application of the elastic impact for separating the structural constituents, the preparation in liquids possessing high specific gravity, and some flotation processes having a selective effect with respect to the petrography of coal.

All these proposals fail, however, to bring about a sufficient enrichment of vitrite and clarite so as to obtain the desired low ash content.

It is the object of the invention to provide a process for obtaining coal particularly poor in ash content, which satisfies both technical and economic requirements, and this object is attained by subjecting coal of suitable grain size, possibly in the form of a washed coarse-, fine- or finest-grained product, first to one of the known preparation methods relying for instance on treatment in liquids of high specific gravity, trough washing or electrostatic processing, which at least to a certain extent have a petrographically separating effect, and then causing the "refined" coal obtained by this preparation and having already a very low ash content amounting to less than 2% to undergo ordinary flotation, possibly after it has previously been disintegrated if necessary to acquire a grain size required for the complete separation of the structural constituents. The flotation has also a petrographically dissociating effect, since due to the preceding steps of treatment, particularly to disintegration, mineral substance has been superficially exposed on the structural constituents of higher combined ash content, so that they are wetted by water during flotation and do not float up. It has been found that in this way a vitrite-clarite enrichment of approximately 95% with an ash content of below 0.6% can be obtained.

The following examples presented to indicate the application of this invention are merely illustrative and not limitative in character:

EXAMPLE 1

Preparation of a washed fine coal first in a liquid of high specific gravity (step 1) and then by flotation of the refined coal obtained (step 2)

	First step		Second step	
	Starting coal	Waste	Refined coal	Pure coal
	Per cent	*Per cent*	*Per cent*	*Per cent*
Ash content	3.2	5	1.35	0.55
Vitrinite	50	42	55	79
Clarite	28	26	26	15
Durite	10	14	11	3
Semifusinite	3.5	8	5	1.5
Fusinite	5	4	3	1.5
Bituminous shale	3.5	6		
	100	100	100	100
Vitrite-Clarite	78	76	81	94

From the washed fine coal representing the starting product and having an ash content of 3.2% a refined coal of 1.35% ash content at a vitrite-clarite enrichment of 81% is obtained due to preparation in a liquid of high specific gravity and particularly to the separation of bituminous shale. By subsequent flotation the ash content of the product is reduced to less than 0.6% and simultaneously the vitrite-clarite content increased to 94%. All structural constituents of high primary ash content, as durite, semifusinite and fusinite, are therefore eliminated with the exception of unimportant residual quantities.

EXAMPLE 2

Preparation of an unwashed fine coal taken from a specimen cut out of a bed in a liquid of high specific gravity (step 1) followed by flotation of the refined coal obtained (step 2)

	First step		Second step	
	Starting coal	Waste	Refined coal	Pure coal
	Per cent	*Per cent*	*Per cent*	*Per cent*
Ash content	10.5	15.9	1.3	0.45
Vitrinite	55	.....	52.5	58
Clarite	30	.....	37	39.5
Durite	.....	.....	.....	.....
Semifusinite	2.5	.....	2	0.5
Fusinite	2.5	.....	3.5	2
Bituminous shale	2	.....	3.5	.....
Tailings	8	.....	1.5	.....
	100	.....	100	100
Vitrite-Clarite	85	.....	89.5	97.5

In this instance, due to the preparation in a liquid of high specific gravity, the ash content of the refined coal amounts to 1.3% at a vitrite-clarite enrichment of 89.5%. Subsequent flotation of the product yielded a pure coal with an ash content of only 0.45% and comprising 97.5% vitrite-clarite, because the original 9% contaminating structural constituents, as durite, semifusinite and fusinite exposed by intermediate disintegration, could be reduced to 2.5%.

Compared with the values obtainable by known processes, a yield of 50% pure coal from washed coal or 40% from raw coal, notwithstanding the considerably higher degree of purity, is remarkably high and clearly indicates the superiority of the new process. Furthermore, the process according to the invention is advantageous also for a subsequent chemical treatment of the concentrates obtained for the purpose of removing additional ash constituents, since the remaining slight ash content, owing to the resulting composition of the mineral substance, is present in an easily decomposable form.

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