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NEGATIVE PLATE MATERIAL FOR
STORAGE BATTERIES

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1

This invention relates to a negative plate material for lead acid storage batteries. More particularly it relates to a negative plate containing a water-soluble synthetic organic expander material.

It is well known that when a storage battery is discharged at a high rate at low temperatures, the electrical output or capacity is considerably less than the theoretical output expected. It has been recognized that the performance of a battery is improved by the addition to the negative plate material of small amounts of carbon black, blanc fixe and certain organic materials known as organic expanders. A number of such organic materials have been proposed but the only effective ones have been the natural lignin derivatives. Such materials have the disadvantage of varying considerably in performance. This variation is related to the unknown composition of the active member in the natural material which thus far has remained unidentified. The resulting performance of a battery in a cold discharge test, therefore, is difficult to standardize.

Recently a group of synthetic phenolic condensation products have been proposed as organic expanders. Such resinous products are insoluble in water, require to be pulverized after filtration and drying and are costly to manufacture. Furthermore, they have not approached the performance of natural expanders in cold capacity tests. While this attempt to standardize the effect obtained by previously unknown natural principles is interesting, the search for reliable synthetic organic expanders which will equal the performance of the natural expanders has continued.

It is an object of this invention to provide an effective negative plate material with reliable cold capacity characteristics. It is a further object to provide a negative plate material containing known synthetic organic addition agents which will give predictable and dependable cold capacity performance.

We have found that a negative plate material containing certain water-soluble synthetic organic compounds to be described contribute towards obtaining such reliable and dependable results. The principal organic compounds employed in this invention may be described as water-soluble sulfonated polycyclic substituted aliphatic compounds, wherein two or more sulfonated cyclic groups are linked together by means of an open aliphatic linkage in contrast to fused cyclic structures. We have found that it is advantageous to employ together with the

2

above-mentioned compounds a proportion of water-soluble hydroxyaryl sulfonate.

More particularly, the products of this invention comprise predominantly litharge, which may as the term is used in this art, consist of lead monoxide or suboxide and metallic lead containing the usual amounts of carbon black and blanc fixe and a small proportion of a sulfonated polycyclic substituted aliphatic compound such as phenolphthalein sulfonate or indigo sulfonate and also a small proportion of a water-soluble hydroxyaryl sulfonate such as 8-hydroxyquinoline 5-sulfonic acid or 1-naphthol 5-sulfonic acid.

It is economical to procure the phenolphthalein or the indigo and to sulfonate them. We have found that the organic compounds employed in this invention must be water-soluble and, therefore, either the acid itself or the alkali metal salts of the sulfonic acid may be employed.

The preparation of total organic material in the negative mix may vary broadly from about 0.1% to 1.0% by weight, the usual proportion being between 0.2 and 0.6%. In employing the combination mentioned, from 1 to 3 parts of the first mentioned organic agent, such as phenolphthalein sulfonate or indigo sulfonate, is combined with one part of the hydroxyaryl sulfonate.

In order to illustrate the products of the present invention, the following examples are offered wherein a standard negative plate base mix material was prepared by intimately dry mixing a finely divided uncalcined Barton litharge containing approximately 30% metallic lead, carbon black and blanc fixe in the proportions of 91 g. of carbon black and 136 g. of blanc fixe per 100 pounds of litharge and the blend of organic material added thereto.

EXAMPLE I

To 100 pounds of a finely divided Barton litharge containing carbon black and blanc fixe as above described were added 272 g. of a blend of 2 parts sodium phenolphthalein sulfonate and 1 part 8-hydroxyquinoline 5-sulfonic acid. The active material was well mixed to disperse the dry constituents and a paste was then prepared by adding 5200 ml. of water and 3200 ml. of sulfonic acid of 1.400 specific gravity. The resulting paste which contained about 0.6% of organic materials by weight was used to prepare negative plates which were employed in making storage batteries of a standard type.

EXAMPLE II

Storage battery paste was prepared in a man-

3

ner similar to that described in Example I except that the 272 g. of blended organic material contained 2 parts of sodium phenolphthalein sulfonate and 1 part of sodium salt of 1-naphthol 5-sodium sulphonate. The resulting paste was then used in preparing negative plates which were employed in making standard storage batteries.

EXAMPLE III

To 4 pounds of a finely divided Barton litharge and the usual blend of 0.2% carbon black, 0.3% blanc fixe by weight, were added 3.6 g. or 0.2% of sodium indigo disulfonate and 3.6 g. or 0.2% of 1-naphthol 5-sodium sulfonate. A paste was prepared by adding 120 ml. of sulfuric acid of specific gravity 1.400 and 208 ml. of water. The resulting paste was employed in the negative plates of standard batteries.

The above batteries were employed in a number of tests in comparison to control batteries with no expander addition and with the addition of a prior art natural expander. The results in minutes of discharge, according to the specifications of the Society of Automotive Engineers, are given in the following table:

Table

Organic Expander Added	Discharge Period, Minutes, After Cycles		
	2	55	135
None.....	2.5 to 3.07	1.73 to 1.75	1.50 to 1.55
72% acid lignin, average.	3.03	2.10	2.00
Example I.....	3.74	4.24	4.80
Example II.....	4.17	4.19	4.05
Example III.....	2.85	4.53	3.70

It will be noted that the products listed in the above table which are examples of the products of this invention, compare favorably to the best natural products available today. This represents a considerable advance in the art of employing known synthetic principles, the possibilities of which are directed to more exact control and reliability.

While this invention has been described and illustrated by the embodiments shown, it is not intended to be strictly limited thereto and other variations and modifications may be employed within the scope of the following claims.

We claim:

1. Active material for negative lead storage battery plates comprising predominantly litharge and a small proportion of a water soluble sul-

4

phonated polycyclic substituted aliphatic compound and a small proportion of a compound selected from the group consisting of 8-hydroxy-quinoline 5-sulphuric acid, 1-naphthol 5-sulphonic acid and their alkali metal salts.

2. Active material for negative lead storage battery plates comprising predominantly litharge and a small proportion of a compound selected from the group consisting of a phenolphthalein sulphonate, indigo sulphonate and their alkali metal salts and a small proportion of a compound selected from the group consisting of 8-hydroxyl-quinoline 5-sulphonic acid, 1-naphthol 5-sulphonic acid and their alkali metal salts.

3. Active material according to claim 1 in which the sum of the proportions of the first mentioned compound and the second mentioned compound amounts to between 0.1% and 1% by weight of the active material.

4. Active material according to claim 1 in which the sum of the proportions of the first mentioned compound and the second mentioned compound amounts to between 0.1% and 1% by weight of the active material and there are present from 1 to 3 parts of the first mentioned compound for each part of the second mentioned compound.

5. Active material for negative lead storage battery plate comprising predominantly litharge and about 0.6% sodium phenolphthalein sulphonate and 0.3% 8-hydroxy-quinoline 5-sulphonic acid.

6. Active material for negative lead storage battery plate comprising predominantly litharge and about 0.6% sodium phenolphthalein sulphonate and 0.3% 1-naphthol 5-sodium sulphonate.

7. Active material for negative lead storage battery plate comprising predominantly litharge and about 0.2% sodium indigo disulphonate and 0.2% 1-naphthol 5-sodium sulphonate.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,460,422	Kohn	July 3, 1923
2,233,281	Brown	Feb. 25, 1941
2,514,415	Rasch	July 11, 1950
2,540,446	Haayman et al.	Feb. 6, 1951

FOREIGN PATENTS

Number	Country	Date
20,596 of 1894	Great Britain	Apr. 13, 1895