

Deuterated Storage-battery Electrolyte

Sergey Sevtsov

Abstract

The technical problem solved in [this work] is to create such an electrolyte so that the diffusion rates of its ions during charging and discharging are as close as possible in magnitude without taking into account the height of the electrolyte volume. The technical result expected from the solution of the technical problem when using the claimed possible invention is an increase in the capacity and average voltage of the bit of lead-acid batteries.

Deuterated storage-battery electrolyte.

The described supposed invention behaves to electrochemistry, in particular to the device of leaden acid accumulators, and it can be used for preparation of electrolyte for these accumulators.

The use of electrolyte is already known - water solution of lye for the receipt of isotope of hydrogen - heavy hydrogen on electrolyzers (Isotopes: properties, receipt, application. Under release V. U. Baranov. M., 2000.-704c, page 147-150). The process of receipt of heavy hydrogen from this electrolyte - analogue is based on that in electrochemical processes easy isotope of hydrogen - a protium is distinguished on electrodes with high speed, than heavy hydrogen (D). Characteristically for a process, that speed of diffusion of protons there is more speed of diffusion of deuterons in an electrolyte. Thus the coefficient of division for this diffusive process turns out at the level of 1,4.

By the characteristic sign of electrolyte - analogue that coincides with the substantial sign of declarable in an invention electrolyte, there is the use of electrolyte water-based, thus with the ions of heavy hydrogen - deuterons.

Reasons impedimental to the receipt of the required technical result of declarable invention - height of capacity of leaden-acid accumulator and increase of middle bit tension at the use of electrolyte analogue (water solution of lye) - following:

1. Naturally in a leaden acid accumulator solution of electrolyte must be not alkaline, and acid is water solution of sulphuric acid.

Technically the process of replacement of lye on acid is real - the electrolytic separation of heavy hydrogen can be produced also and in sour solution. Thus due to that at the electrolysis of water there is a separation of isotopes electrolysis bits (for example, acid of old accumulators) and pieces have greater maintenance of deuterons, what usual water, and accordingly they can be applied as a feedstock for the receipt of heavy water (Jl. Farkas, Cambridge, Heavy isotope of hydrogen. A magazine is "Successes of physical sciences". Moscow, 1935, Tom XV, release I, page 26).

2. The small concentration of deuterons in solution - analogue.

Solution - an analogue is prepared on the basis of natural connection of isotopes of hydrogen - usual water in that maintenance of heavy hydrogen (D) makes approximately 0,015% atoms. In principle, the decline of speed of diffusion for a deuteron will allow to compare this speed at a speed of diffusion of other ions locomotive west-to-east on other electrode. However from insignificant maintenance of deuterons and electrolyte - analogue this effect will be insignificant for consideration of him as it applies to work of leaden acid accumulator.

As a prototype on totality of signs most near to totality of substantial signs of declarable invention, an acid electrolyte - water solution of sulphuric acid is chosen (Theoretical bases of decision of problem of increase of tenures of employment of storage batteries at storage and increase of efficiency of methods of their renewal [Text]: A. A. Kochyrov, V. U. Gumelev, H. P. Shevchenko; under red. A. A. Kochyrov. it is Ryazan: Ryazan Higher Airborne Command School, 2012. - 252 p., page 12,37.). Thus on existent ideas about flowing of electrochemical processes in a leaden acid accumulator, the increase of concentration of sulphuric acid takes place anymore at positive electrodes, what at negative. It is explained by that the ions of SO_4^{2-} move in this case from negative to the positive electrode. Coming from the rates of movement of ions of H^+ and SO_4^{2-} in an electrolyte, it is set that increase of concentration of sulphuric acid at positive electrodes approximately in 1,4 time higher, than at negative electrodes. At a digit a picture will be reverse.

Therefore, taking into account this circumstance, in practice take measure to the improvement of circulation of electrolyte at electrodes.

It is so, for example, known from the theory of leaden acid accumulator, that on 1 A-ч of the taken off capacity is required $\sim 8,4 \text{ cm}^3$. Thus this theoretical value is минимально-допустимым and needs experimental verification and to clarification (Dasoyan M. A., Aguf I. A. Bases of calculation, constructing and technology of production of leaden accumulators. - Jl.: Energy, 1978. 152 with, silt., page 18,20.).

Experimentally for accumulators with mainly stationary office hours more suitable is an amount of electrolyte a 15 - 25 cm^3 on 1 A-ч . It should be remembered that than more electrolyte, the less than his closeness changes during work and, consequently, diffusion, the increase of capacity and middle bit

tension, т. of ϵ идет after that, gets better. a return (H. Lamtev, Home-made accumulators, STATE publishing HOUSE ON QUESTIONS of RADIO, MOSCOW, 1936., page 43) rises.

Examining expediency of improvement of prototype it is needed to mark that actual energy of leaden accumulator, equal 20 - 30 Вт-ч/of kg, is 10 - 20 % from theoretical; thus this value was got as a result of the protracted evolution of leaden-acid accumulator (Electric car: Technique and economy / of V. A. Bristle, U. Y. Morgovsky, B. I. Tsenter, V. A. Bogomazov; Under red. V. A. Bristle - L.: Engineer. Leningrad, 1987. - 253 p.: silt., page 45.).

Totality of signs of prototype, similar with totality of substantial signs of declarable device following, :

1. basis of solution for an electrolyte water with the presence of ions - deuterons;
2. sulphuric acid.

Reason, impedimental to the increase of capacity and middle bit tension of leaden acid accumulator at application of electrolyte - prototype consists in a presence next technical contradiction. From one side, что-бы to increase a capacity and return of accumulator it is necessary to increase the amount of electrolyte. But on the other hand the increase of electrolyte results in the increase of internal resistance of accumulator from the height of sizes of workpiece-to-electrode. In the total from the height of resistance part of energy of accumulator will be lost as a result of his heating.

A technical problem arising up at the removal of the considered technical contradiction consists in creation of such electrolyte at that speeds of diffusion of his ions at charging and discharging were as possible near by value without the height of объема electrolyte.

The technical result expected from the decision of technical problem at the use of declarable possible invention is an increase of capacity and middle bit tension for leaden acid accumulators.

The decision of technical problem takes place due to that for an electrolyte, having next characteristic substantial signs consilient with the characteristic signs of electrolyte, - prototype :

1. basis of solution is water;
2. the dissolved substance is sulphuric acid,

a next substantial distinguisher is added:

1. protons in water and acid are transferable deuterons .

At addition of this substantial sign it will be observed decline of difference of speed of diffusion of diplons in relation to speed of diffusion of ions of SO_4^{2-} . Thus such improvement of diffusion will not demand the increase of объема electrolyte as compared to theoretical. Naturally, the decline of объема of the required electrolyte will bring down resistance of accumulator with the offered electrolyte. In the total the planned technical result will be attained is an increase of capacity and middle bit tension (return) for leaden - acid accumulators.

Creation of new declarable type of electrolyte can not be an end in itself, and serves for application in new leaden - acid accumulators.

On this basis, the next variant of the use of the declarable supposed invention is possible.

Leaden acid storage batteries are known with a small capacity and internal resistance, constructed by an academician P. L. Kapitsa for the experiments on the receipt of the superstrong impulsive magnetic fields (Carasik V. R. Physics and Technique of the Strong Magnetic fields. Publishing house "Science", 1964, 340 pages, page 113-114.). The battery of accumulators consisted of two blocks. Every block was a package of square leaden plastins by a section 35×35 cm. and in 1,5 mm. Plates were dissociated from each other by rubber disks by a diameter 1,5 cm. and in a 1,7 mm thick, located in the chess order and glued to one of plastins in every pair. Between the edges of plastins rubstrips were placed, having U - vivid form. A package consisted of a 71 plate and tightened between cutoff flags by eight screw-bolts. Extreme leaden plates were more massive than other and токоподводами served. Cracks between plates were filled by sulphuric acid, and at the key-in of current through a block on plates an active layer was formed. Because the layer of electrolyte between plates is thin, - 3 - and the area of plastins is high, that internal resistance of battery is small. An active layer was done by thin, to decrease the capacity of battery and discharging duration. At discharging on external resistance equal to internal resistance of battery (0,02 Om.), on loading power was distinguished 1 MW at the maximal size of bit current 7 ка. Duration of current impulse made 0,025 secs.

If to take the accumulator of П. Л. to fill Капицы the offered deuterated acid electrolyte and to increase the thickness of active layer, then it will be possible to save small internal resistance of battery, but already to use her for the protracted digits. It is thus assumed that the height of capacity and среднеразрядного tension at a small gap between electrodes and large time of digit will be provided with

the improvement of diffusion at application of new declarable electrolyte.

Table of contents of the deuterated sulphuric acid of D_2SO_4 in heavy water of D_2O approximately in the beginning will be accepted by analogy with "classic" accumulators from 36 to 42% (Dasoyan M. A., Aguf I. A. Bases of calculation, constructing and technology of production of leaden accumulators. - L.: Energy, 1978. 152 with, silt., page 16.).

Maybe the concentration of the deuterated sulphuric acid will be to increase from deceleration of reactions in solution with diplons.

As heavy water it is possible to apply the water got from easy (natural) water with a small requirement to possible remaining maintenance of easy water. On a cost such heavy water will be about 200 - 300 dollars after 1 kg (V. U. Baranov, D. D. Maluta, G. A. Polyakov, Laser division of isotopes of hydrogen, Preprint IAE - 4701/3. Moscow - 1988, page 1; electronic resource - <https://deuteriumoxideprice.blog.ir/>).

Table of contents of easy water as admixtures in heavy morally at charging of new accumulator will go down.

In other maybe and making of heavy water at incineration of heavy hydrogen with oxygen.

The deuterated sulphuric acid will be to make by a chemical method.

Examining costliness of дейтериесодержащего electrolyte it should be noted next remarks:

a) in an accumulator with the offered electrolyte the amount of such electrolyte will be diminished;

b) reduction of объема electrolyte will decrease объем of new accumulator, and and his price;

c) the substituting by the new offered electrolyte is intended for the height of capacity and middle tension of digit.

Adding up foregoing it is possible to suppose that height of cost 1 Вт-ч will be justified from - after the expected height of specific power descriptions of accumulator with a new electrolyte.

Formula of invention.

Electrolyte for leaden acid accumulators, anhydrous and sulphuric acid, different that protons in water and acid are transferable diplons.

Report.

Deuterated storage-battery electrolyte.

An invention can be applied as an electrolyte for leaden кислотных accumulators. The technical problem decided by a declarable invention consists in creation of such electrolyte at that speeds of diffusion of his ions at charging and discharging were as possible near by value without the height of объема electrolyte. The put problem decides replacement of all protons in water solution of sulphuric acid on diplons. Technical the result expected from the decision of technical problem at the use of declarable possible invention is an increase of capacity and middle bit tension for leaden acid accumulators.

Author (declarant) Sergei. Sevtsov

E-mail: 30071962@mail.ru

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At the moment (September 23, 2020), the application is undergoing the stage of an expert examination in essence - see the attached letter from ROSPATENT.



Севцову Сергею Викторовичу
ул. Виноградная, 5
г. Стаханов
Луганская обл.
Украина
94012

На № - от 16.03.2020

Наш № 2020110824/07(018123)

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Исходящая корреспонденция от **13.07.2020**

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принятой к рассмотрению по результатам проведения формальной экспертизы.

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