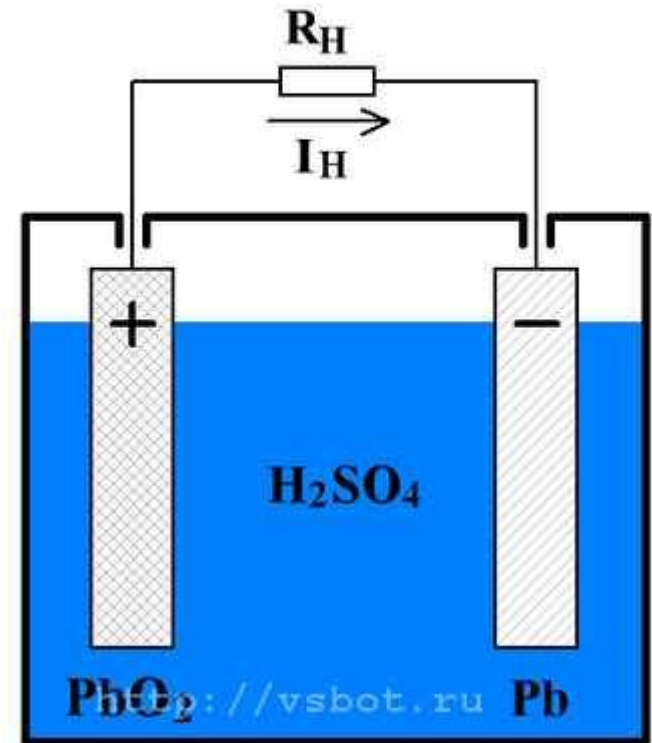


Accumulation of  
electricity:  
lead-acid  
batteries

Свинцово-кислотный  
аккумулятор

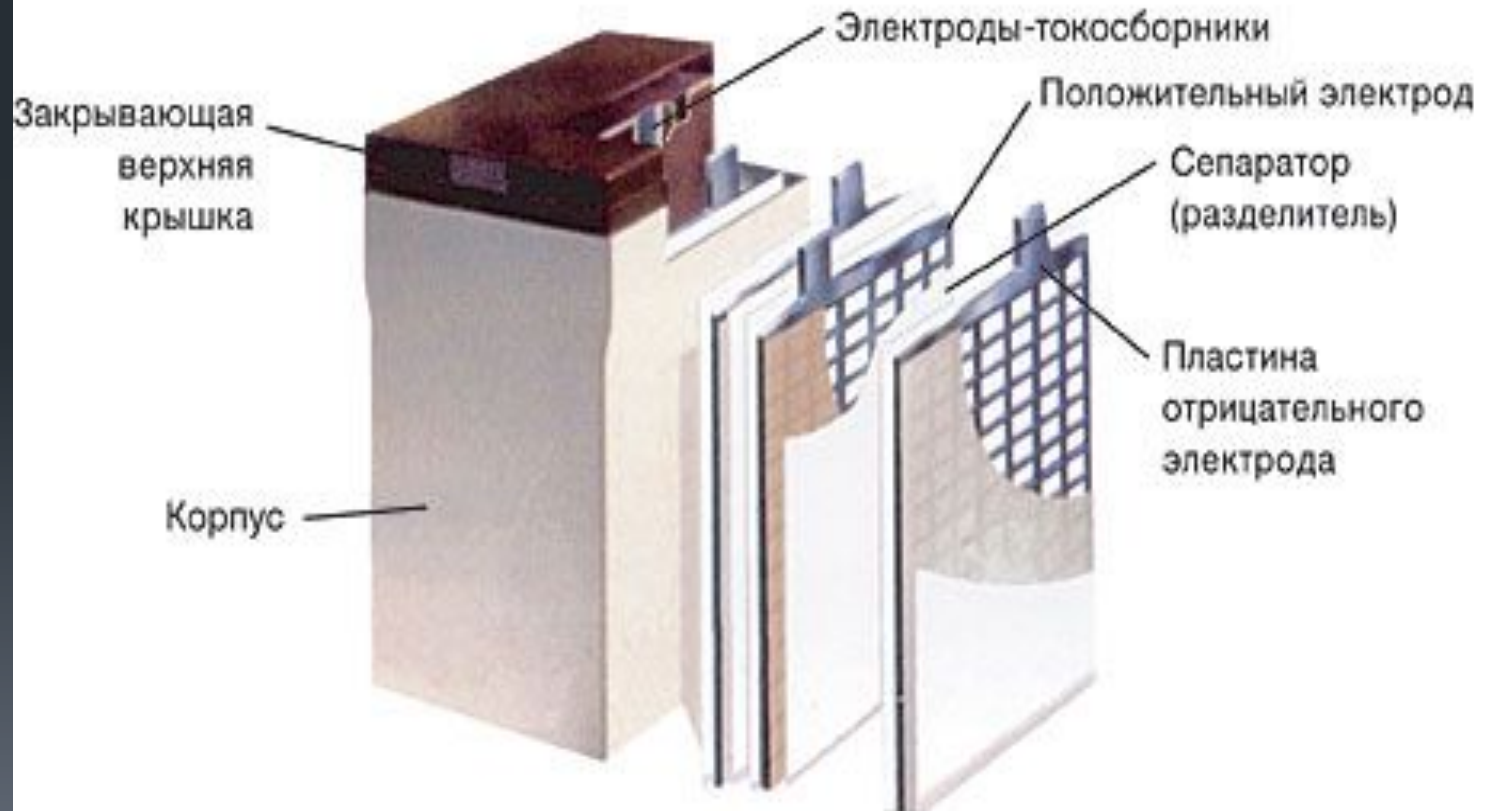




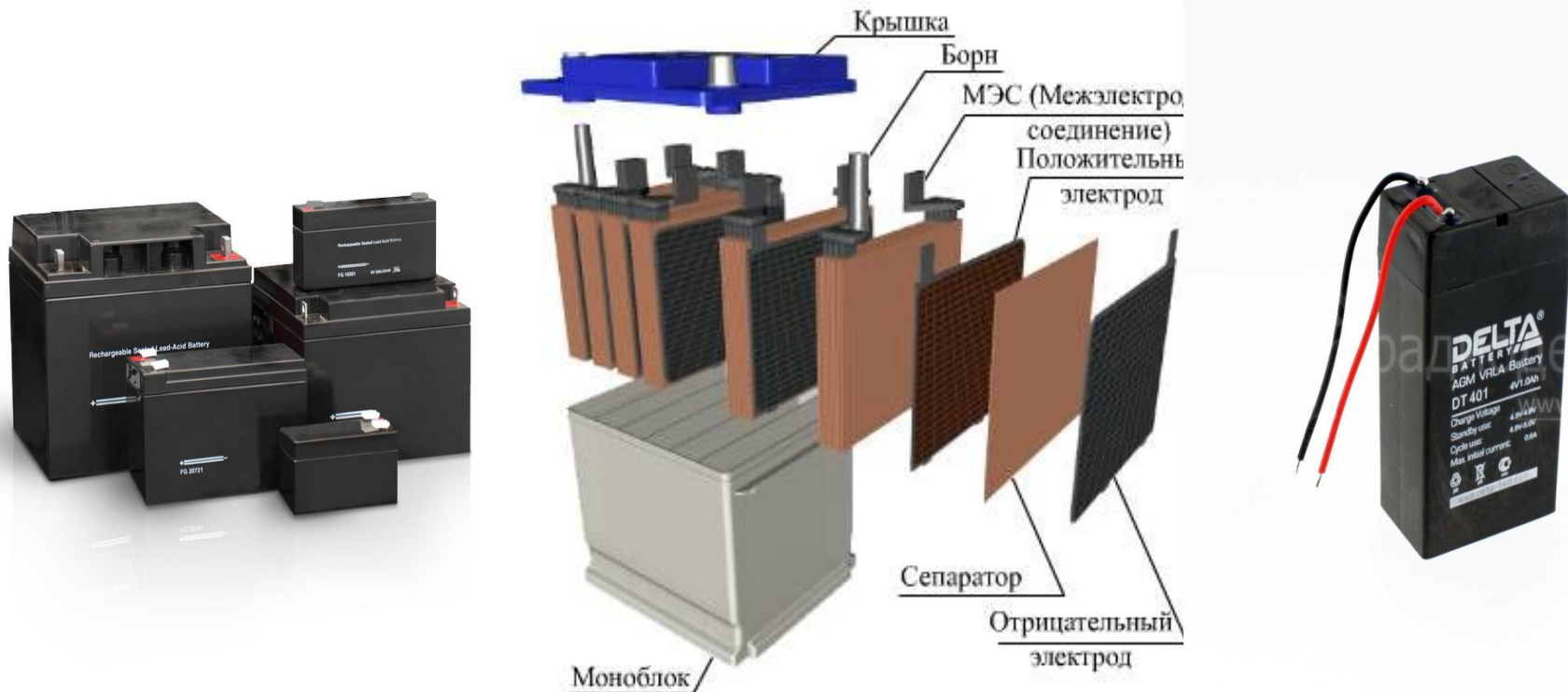
# Electricity

- The most perfect form of energy, and therefore in the direction of the search for cheap and effective methods for its accumulation are made tremendous efforts.

*A device that enables the absorption and the electricity issue, call the electric or battery electric battery. Under this definition does not include devices with different intermediate energy carriers, and in particular, a combination of electrolysis and fuel cell.*



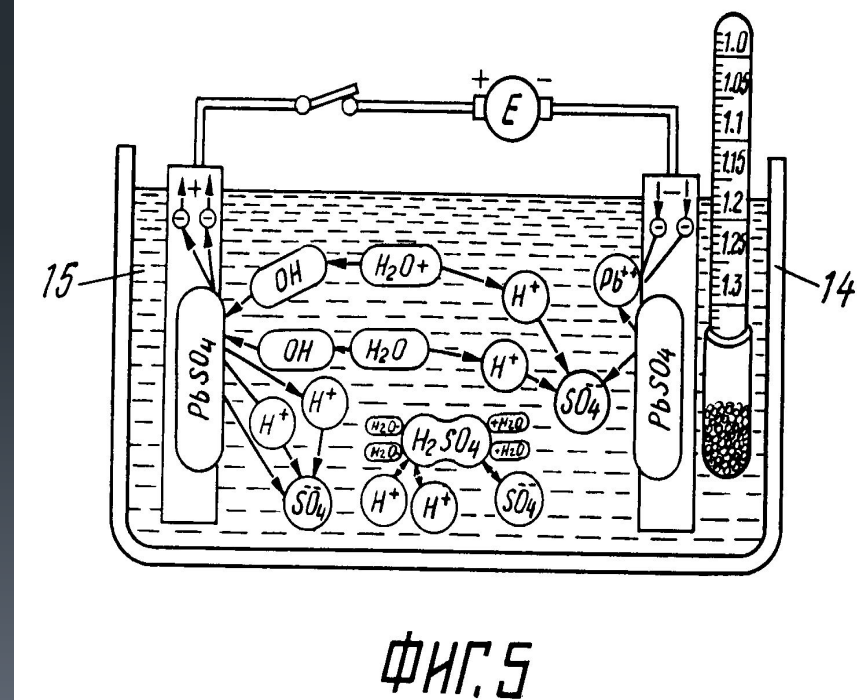
Electric batteries are an essential part of almost all photovoltaic and small wind turbines: works on creation of efficient batteries for vehicles.



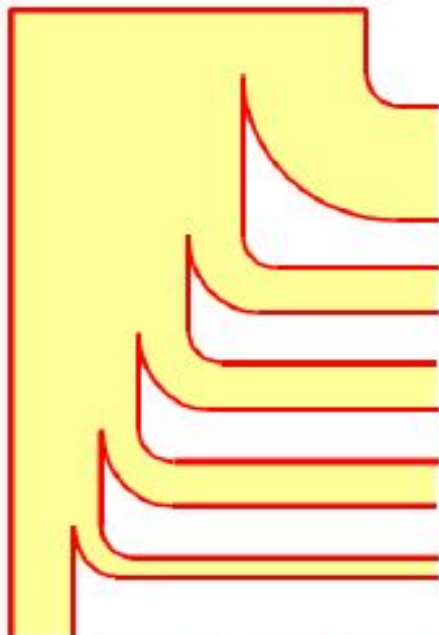
# Lead-acid batteries

In the charged state the anode (negative electrode) of the battery includes lead and the cathode (positive electrode) - PbO<sub>2</sub> of lead dioxide. Both electrodes are made porous. The design of the electrodes depends on the purpose and capacity of the battery and can be quite varied.

- The chemical reactions during charging and discharging battery represented by the formula
- $\text{PbO}_2 + \text{Pb} + 2\text{H}_2\text{SO}_4 \rightleftharpoons 2\text{PbSO}_4 + \text{H}_2\text{O}$



Теоретическая удельная  
аккумулирующая  
способность 167 Wh/kg



Уменьшение удельной  
аккумулирующей способности :

- 35 % неполное использование активной массы
- 14 % разбавление кислоты (свинец допускает концентрацию кислоты до 35 % по массе)
- 13 % неполное использование кислоты
- 14 % конструкционные и соединительные части
- 6 % оболочка и другие пассивные части

Фактическая удельная аккумулярующая  
способность 30 Wh/kg (18 % от теоретической)

For battery theoretically required energy density of 167 W / kg. The same number expressed, therefore, its theoretical limit of the specific storage capacity. Factors contributing to reduction in storage capacity, clearly shown in Fig. 1. The efficiency of the battery is typically in the range of 70% to 80%.



- From the data it follows that the specific storage capacity of a lead battery is significantly lower than the primary electrochemical cells. However, this drawback is usually compensated
- 1) to repeatedly charge and, as a result, approximately tenfold cost reduction derived from battery power,
- 2) the ability to make batteries with a very high energy content (if necessary, for example, up to 100 MW • h).

Each of the charge-discharge cycle is accompanied by some irreversible processes at the electrodes:

- - The slow accumulation of the non-reducing sulphate of lead in the mass of electrodes
- - After a certain number (usually around 1000) battery cycles loses its ability to properly charge
- - It can happen with long-term non-use battery
- - Lead battery loses due to the self-discharge is usually from 0.5% to 1% of their charge per day (constant recharging used to compensate)
- - Other irreversible process is the electrolysis of water ( "boil" the battery.
- - Water loss can be easily compensated by topping up, but can release hydrogen with the air create an explosive mixture in the battery room or compartment. To avoid the risk of explosion must be provided with appropriate ventilation reliable.