relations between the decrease in the Stern layer capacity and the added amounts of surface active agents and dioxane. For such cases, the electrochemical free energy of adsorption must be used in order to obtain adequate distribution functions. The final equations thus obtained involve the surface potential and the surface charge as variables, and can be used to reproduce observed relations between the double layer capacity and the polarisation.

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Sintered-Type Alkaline Storage Batteries. VI. Influence of Preparing Conditions upon the Durability of the Sintered-Type Cadmium Negative Plate

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1. Purpose and Method of the Experiments

Capacity of the sintered-type cadmium negative plate decreases gradually with the repeated charge and discharge cycles. In this experiment, influences of the preparing conditions, such as sorts of cadmium salts for impregnation, specific gravities, current densities for reduction and sintering temperatures of plaques on the durability of the negative plate were examined, because it was considered that they have some connection with the plate performance.

Preparation of the plate was made by the usual method except in the impregnation of the active material; it was done under atmospheric pressure in this experiment. The impregnation were repeated 5 to 7 times and the weights of active material were 11 to 13 g.

One of the test plates and two of the pocket-type positive plates which had larger capacity than the negative plate were combined in a 500 cc glass vat. These plates were separated by a glass rod and the vat was filled with KOH aqueous solution. (sp. gr. 1.24 at 20°C)

The test cells were set in an air-thermostat. Capacity and life tests were carried out after the initial charge. Conditions of the tests were as follows :

Capacity test; discharged at 0.5 A until the end voltage of 1.0 V

Life test; discharged at about 1.4 A for 1 h

charged at about 2.5 A for 1 h

under constant resistance

temp., $30^{\circ} \pm 2^{\circ}\text{C}$

2. Results of the Experiments

2.1 Effect of the sorts of cadmium salt and the current densities for reduction $\text{Cd}(\text{NO}_3)_2$ aq. and CdCl_2 aq., (sp. gr. 1.50 at 20°C) were used as the cadmium salts. The current densities for reduction were 4 and 10 A/dm². The preparations of plates and the life tests were both repeated twice, because there were often variances among the results of the experiments. The results on the capacity changes of the test plates are shown in Fig. 1 (the 1st experiments) and Fig. 2 (the 2nd experiments). On the plates prepared with $\text{Cd}(\text{NO}_3)_2$, the initial capacities are larger but the capacity decreases more than those with CdCl_2 .

On the effect of the current densities, decreases in the capacity of the plates reduced at 4 A/dm² are smaller than those reduced at 10 A/dm², as shown in Fig. 1, but they are not apparent in Fig. 2.

Fig. 1 Influence of the sorts of Cadmium salts and the current densities for reduction (the 1st exp.)

Fig. 2 Influence of the sorts of Cadmium salts and the current densities for reduction (the 2nd exp.)

Fig. 3 Influence of the specific gravities of CdCl_2 aq. and the sintering temperatures of the plaques

with CdCl_2 aq. of sp. gr. 1.72. On the other hand, the capacity of the plate using the plaque sintered at low temperature is larger than that of the one using the plaque sintered at high temperature for the plate prepared with CdCl_2 aq. of sp. gr. 1.50.

The best preparing conditions for the cadmium negative plate are as follows;

sintering temp., 800~850°C

sintering time, 8 min.

cadmium salt, CdCl_2 aq., sp. gr. 1.50

2.2 Effect of the specific gravities of CdCl_2 aq. and the sintering temperatures of the plaques The specific gravities of CdCl_2 aq. were 1.50 and 1.72 at 20°C and the sintering temperatures were 800~850°C and 900~950°C. Two plates were prepared under each condition. Capacity and life tests were carried out and the mean value of the two were plotted in Fig. 3.

The plates prepared with CdCl_2 aq. of sp. gr. 1.72 are smaller in the initial capacities and larger in the capacity decrease up to the 25th cycle than those prepared with CdCl_2 aq. of sp. gr. 1.50. The capacity changes between the 100th and the 300th cycle are almost equal for the both.

The effect of sintering temperature on the capacities is not clear for the plates prepared

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