

absence of free Ca^{++} in the medium was pronouncedly inhibited by presence of 4 mM ATP. The ATP added was hydrolyzed by 28% in the absence of free Ca^{++} during the 40 minutes incubation.

As anticipated from the previous experiments, the $\text{P}_i \rightleftharpoons \text{HOH}$ exchange was completely inhibited in the presence of 60 μM free Ca^{++} in the medium. The inhibition of $\text{P}_i \rightleftharpoons \text{HOH}$ exchange by the Ca^{++} was unaffected by addition of 4 mM ATP, while ATP hydrolysis was activated by the Ca^{++} and 62% of the added ATP was hydrolyzed in the presence of 60 μM Ca^{++} during the 40 minutes incubation.

Similar measurements were performed to measure the effect of acetylphosphate on the $\text{P}_i \rightleftharpoons \text{HOH}$ exchange in the absence and presence of 60 μM Ca^{++} . As shown in Table II, addition of 3.3 mM acetylphosphate showed no appreciable or a slightly inhibitory effect on the $\text{P}_i \rightleftharpoons \text{HOH}$ exchange in the absence of free Ca^{++} in the medium, while the $\text{P}_i \rightleftharpoons \text{HOH}$ exchange inhibited by 60 μM Ca^{++} appeared to be somewhat reactivated by the addition of acetylphosphate. No hydrolysis of acetylphosphate was detected either in the absence of or in the presence of Ca^{++} .

Fig. 8 shows the effect of ADP on the $\text{P}_i \rightleftharpoons \text{HOH}$ exchange catalyzed by sarcoplasmic reticulum vesicles in the absence of free Ca^{++} in the medium. A rather high concentration (20 mM) of MgCl_2 was used to minimize change in the free Mg^{++} concentration due to addition of ADP. The rate of $\text{P}_i \rightleftharpoons \text{HOH}$ exchange without added ADP, equivalent to 37.6 gram atoms oxygen exchanged/sec $\cdot 10^6$ gm protein, was considerably higher than that measured at 5 to 7 mM MgCl_2 under otherwise the same conditions (Figs. 2,3 and 9, Tables I and II). As seen in the figure, the rate of $\text{P}_i \rightleftharpoons \text{HOH}$ exchange was markedly decreased with increase in concentration of ADP added. Addition of 0.5 and 3.0 mM ADP caused, respectively, 67 and 87% inhibition. However, the inhibition was not