

Progress of Reproducing the Mizuno's Experiment in QiuRan Lab

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The objective of this study was to independently reproduce Mizuno's experiment.

We replicated the $D_2(H_2)$ -Pd(Ni) reaction system reported in the literature[1]. On the other hand, we developed a different calorimetric system employing two calorimeters to measure the heat generated by the reaction system. One is a Seebeck calorimeter and the other is based on the hydrothermal temperature difference. We improved the reliability of the Seebeck so that it achieves 0.1W accuracy consistently..

We operated the $D_2(H_2)$ -Pd(Ni) reaction system at different conditions. The following observations were found to be reproducible:

Condition 1: When the pressure of D_2 in the system was higher than 6 kPa, no excess heat could be observed.

Condition 2: Initially with ~800Pa D_2 inside the system, we applied vacuum-pumping to the system for 5 hours, during which a negative excess heat (heat absorption) pulse was observed. After rebalancing, we filled D_2 to the system quickly to reach 800Pa again, a positive excess heat (heat generation) pulse was then observed, which peaked at 40W and last for 4 hours. Integration of the two pulses would result of a net gain of 40kJ excess heat. An input heating power of 250W was maintained throughout the experiment.

Condition 3: Initially with ~500Pa D_2 inside the system, we repeated the operations of quickly pumping vacuum and refilling D_2 to reach 500Pa, positive excess heat pulses were then observed in most cases. These pulses peaked at 3-5W and last for 3 hours. An input heating power of 250W was maintained throughout the experiment.

Condition 4: The pressure of D_2 in the system was maintained at ~10Pa. Continuous excess heat power of 1.5-2.5W was observed while the input heating power was between 150W and 250W.

In conclusion, we were able to reproduce the Mizuno's Experiment to a certain extent in QiuRan lab. The power level of excess heat was found to be related to the D_2 pressure, input heating power and the vacuum-pumping operations. Although reproducible, the level of excess heat power in this study was far less than that observed in the Mizuno's experiment. In QiuRan lab, we are building and testing new $D_2(H_2)$ -Pd reaction systems for higher level of excess heat.

[1] Mizuno, T. and J. Rothwell. Increased Excess Heat from Palladium Deposited on Nickel (Preprint). in The 22nd International Conference for Condensed Matter Nuclear Science ICCF-22. 2019. Assisi, Italy. June 18, 2019version