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Catalytic water formation on free platinum and palladium clusters MATS ANDERSSON, ARNE ROSEN, Göteborg University — A pulsed beam of neutral metal clusters is generated with a laser vaporization source. The cluster beam passes through two reaction cells, in which the clusters make from less than one up to a few collisions with the reactive molecules. The clusters are detected with laser ionization and time-of-flight mass spectrometry. By measuring the abundance of pure clusters and reaction products as a function of reaction cell pressure, the reaction probability in a cluster-molecule collision can be determined. Platinum clusters with more than 6 atoms form stable reaction products with both oxygen and hydrogen. When the clusters first react with oxygen and then with hydrogen we measure a decreasing number of oxygen atoms adsorbed on the clusters as the number of cluster-hydrogen collisions is increased. The interpretation for this is that water molecules form on the clusters and desorb. The efficiency of the reaction is high on all cluster sizes measured (7-30 atoms), with only a weak size dependence. The water formation reaction also proceeds on palladium clusters in the same size range.

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