Plasma chemical reactor for processing plant waste into liquid silicates consists of a cylindrical lined vessel, a plasmatron, a feed system, an outlet pipe for removing gaseous products, and a device for removing the liquid phase. The plasmatron is designed as a rotating sliding discharge generator with the ability to change the direction of the plasmatron e rotation clockwise or counterclockwise; the reactor reaction zone is equipped with a tangential inlet for plasma-forming gas to create a stable vortex flow with an azimuthal velocity component ranging from 400 to 700 m/s, the feed system includes a dosing unit for the controlled feeding of pre-crushed biomass with a moisture content of no more than 5% and a particle size distribution ranging from 0.5 to 5 mm; the reactor vessel is equipped with a heat recovery system to maintain the reactor wall temperature in the range of 350–900 °C without formation of a crust, while the ratio of plasma torch power to feedstock throughput ranges from 0.4 to 2 kW·h/kg, and the residence time of feedstock particles in the reaction zone is from 0.5 to 2 seconds.