

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Hydrogen Fueling via Guanidine J. A. VAN VECHTEN, Oregon Sustainable Energy — Three related materials, ammonia (NH_3), urea (OCN_2H_4), and guanidine (CN_3H_5) are practicable hydrogen-based fuels¹ that could be produced in the giga-tonne quantities required from air, water and renewable energy. NH_3 has long been established as a fuel for internal combustion engines and can be cracked to H_2 for use in fuelcells, but is a gas at STP and extremely toxic, so general use is problematic. Urea and guanidine can easily be converted to NH_3 and CO_2 by addition of hot water from oxidation of NH_3 . Both are solids at STP, non-toxic, non-explosive and commonly shipped in plastic bags. The energy density in kWhr/L of guanidine is 4.7 compared with 3.0 for urea, 3.5 for liquid NH_3 , and 0.8 for H_2 gas in 10,000 psi tanks. The specific energies in kWhr/kg for these materials are respectively 3.58, 2.35, 5.2, and (including the tank) 1.8. Guanidine melts at 50 C and is infinitely soluble in both ethanol and water. 1) <http://www.energy.iastate.edu/renewable/biomass/AmmoniaMtg06.html>

J. A. Van Vechten
Oregon Sustainable Energy

Date submitted: 22 Nov 2006

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