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# Catalysis Club of Philadelphia

Thursday, March 13, 2008

Holiday Inn Select Hotel  
Naamans Road and I-95, Claymont, DE

## Hydrogen Storage and Delivery Using Liquid Carriers

Guido Pez

Materials Research Center, Air Products and Chemicals Inc.

&

## Student Poster Competition

**Note: The Competition Starts at 5:00 PM**

### Student Posters and

**Social Hour: 5:00 PM**

**Dinner: 6:30 PM**

**Meeting: 7:30 PM**

Members: \$30.00

Walk Ins & Non-members: \$35.00

Student & Retired Members:

\$15.00

### **Menu**

**Chicken Champagne**

**Roast Loin of Pork - Served with  
Sam Adams Beer and Onion Sauce**

**Pasta Primavera - Fresh Seasonal  
Vegetable in a Light Blush Sauce**

**Meal reservations** - Please notify your company representative or Carl Menning (menning@udel.edu, phone: 302-893-9398, fax: 302-831-1048) by **Thursday, March 6.**

Company Representatives – We would like to encourage you to make meal/meeting reservations to your company representative.

**Membership** - Dues for the 2007-08 season will be \$10.00 (\$5.00 for the local chapter and \$5.00 for the national club). Dues for students and post-docs will be \$6.00 (\$5.00 for local club and \$1.00 for national club). Please send your payment to Steve Harris, Lyondell Chemical Co., 3801 West Chester Pike, Newtown Square, PA 19073-2387.

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## Hydrogen Storage and Delivery Using Liquid Carriers

Guido Pez

Materials Research Center, Air Products and Chemicals Inc.

Allentown, Pa 18195

### Abstract

In our concept of a “non H<sub>2</sub> gas” hydrogen energy infrastructure the carrier is an organic liquid which can undergo a reversible catalytic addition of hydrogen. Thus, the hydrogen “loaded” liquid can be catalytically dehydrogenated at the point of use which may be a stationary or mobile location. The concept will be illustrated by the performance of N-ethylcarbazole but also of other N- and O-heterocyclic molecule liquid carriers. The catalytic dehydrogenation requires an input of heat at temperatures of 150 – 200 ° which may be difficult to realize with PEM fuel cell sources. To address this we’ve developed the concept of auto thermal liquid carriers, compositions that in appropriate catalytic dehydrogenation reactor systems could provide both the stored hydrogen and the thermal energy that is required to liberate it.

With acknowledgement to collaborators at Air Products: Alan Cooper, Aaron Scott, Bernard Toseland, Hansong Cheng and Fred Wilhelm.