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ISBN 8412-0771-2

AMERICAN CHEMICAL SOCIETY

WASHINGTON, D.C.
August 28–September 2, 1983

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61. RADIO-TRACER STUDIES ON THE INTERACTIONS OF HYDROGEN WITH Pd/C AND Pd BLACK CATALYSTS, K.-L. Loh, C.-M. Hong and Y.-N. Tang, Department of Chemistry, Texas A&M University, College Station, Texas 77843

The adsorption and absorption of hydrogen on Pd/C as well as Pd black were investigated with tritium as a radioactive tracer over a wide range of temperature (-196 to 600°C) by the Temperature Programmed Desorption (TPD) techniques. Six energetically different states of adsorbed hydrogen on Pd/C, known as the A, B, C, D, E, and F sites, were observed by the appearance of six TPD peaks, with maxima at about -120, -50, 0, 120, 250, and 500°C, respectively. All of these peaks except that of site A were also found on the Pd black catalyst with peak maxima temperatures shifted slightly higher. The experimental results indicated that site A hydrogen only exists in the molecular form on the supporting material, charcoal, which was acting as a hydrogen reservoir, while the hydrogen on the other states, B, C, D, E, and F, dissociatively adsorbed on Pd in the atomic forms. The activation energies of desorption for these states were also evaluated, ranging from 0.8 to 11 kcal/mole.

62. STUDIES ON SUPPORTED TRANSITION-METAL CATALYSTS FOR SYNGAS CONVERSION TO ETHANOL ON Rh-Nb₂O₅/SiO₂ CATALYSTS. Y. C. Yang, J. P. Liu, D. A. Chen and K. R. Tsai. Institute of Physical Chemistry, Xiamen University, Xiamen, China.

It has been reported in the literature that metal oxides strongly influence the spectrum of reaction products from conversion of syngas over supported rhodium catalysts. Making use of the characteristically high catalytic activity and selectivity of supported niobia, Nb₂O₅/SiO₂, in the conversion of acetylene into benzene, we demonstrate in the present work that, on the surface of Rh-Nb₂O₅/SiO₂ (Rh 1-5%w/w, Nb₂O₅ 1-10%w/w) catalysts, syngas-conversion active sites and acetylene-cyclotrimerization active sites co-exist so that each syngas-to-ethanol-conversion active site might actually consist of a Rh-site and a partially oxygen-deficient Nb₂O₅-site acting together to activate chemisorbed CO and bring about the conversion. Our data from complete g.c. analysis of the reaction products including CO₂, which accounted for less than 20% of the observed carbon efficiency in most cases, and complete carbon balance, do not support the reaction mechanism which involves disproportion of 2 CO into C + CO₂ as one step of the predominant reaction pathway. Catalytic activities and selectivities of samples of Rh-Nb₂O₅/SiO₂ and Rh-La₂O₃ observed under our experimental conditions were comparable with that reported by Ichicawa. Reaction mechanism will be discussed.

● TUESDAY MORNING - SECTION A - SYMPOSIUM ON COLLOIDAL PARTICLES: POLYMER ADSORPTION AND STERIC STABILIZATION: 111 (CONTINUED) - COSPONSORED WITH DIVISIONS OF ORGANIC CHEMISTRY, POLYMER CHEMISTRY AND POLYMERIC MATERIALS SCIENCE AND ENGINEERING - F.M. Fowkes, Presiding

63. THE STABILITY OF STERICALLY STABILIZED NONAQUEOUS DISPERSIONS AT ELEVATED TEMPERATURES AND PRESSURES. M.D. Croucher and K. Lok, Xerox Research Centre, 2480 Dunwin Drive, Mississauga, Ontario L5L 1J9, Canada

The "protection" of colloidal particles using nonionic polymers has been found to be extremely effective in media of low dielectric constant. Recent experimental and theoretical results on dilute sterically stabilized polymer colloids have indicated that the free energy of interaction of such particles consists of (i) a combinational contribution (ii) a contact energy dissimilarity contribution and (iii) a free volume dissimilarity contribution. It has been shown that it is the free volume dissimilarity contribution that exists between the steric stabilizer and the dispersion medium that causes nonaqueous dispersions to flocculate at the upper critical flocculation temperature (UCFT). The pressure dependence of the UCFT i.e., dT/dP, in numerous nonaqueous dispersions has a large positive value in agreement with theoretical predictions. These results provide further evidence of the importance of free volume effects on the high temperature stability-instability transition in nonaqueous dispersions.