108. Thermodynamics of the solid-gas phase interactions in the carbon-oxygen-hydrogen system

S. K. Das† (*The University of Michigan, Ann Arbor, MI*). The solid and solid–gas phase boundary lines in the carbon–oxygen–hydrogen system were calculated from the available thermodynamic data as a function of temperature (673–2773°K), pressure (10^{-6}–100 atm), and carbon activity (0·5–1·0). In contrast to lower temperatures, the phase boundary line is independent of system pressures and carbon activities at 2773°K.

†Present address: Alcoa Laboratories, Alcoa Center, PA 15069.

109. Oxygen uptake by wet activated carbon

R. K. Sinha, R. F. Sutt, J. R. Lutchko and R. S. Joyce (*Calgon Corporation, Pittsburgh, PA 15230, U.S.A.*). The investigations show that water wet activated carbon preferentially picks up oxygen from air. The oxygen is shown to be weakly held on the surface. The pickup appears independent of the precursor and the temperature history of the carbon. The amount of uptake does not depend on pH of the wetting solution.

110. Activated carbon—II. Adsorption of acids from concentrated electrolyte solutions†

K. A. Kraus and F. Nelson (*Oak Ridge National Laboratory, Oak Ridge Tenn, U.S.A.*). At high ionic strength, adsorption of electrolytes by activated carbon is surprisingly similar to that by organic anion exchange resins. We earlier demonstrated the similarity with adsorption of complex ions. We here extend this comparison to some simple acids and salts. Activity coefficients of HCl and LiCl computed for the carbon phase are also similar to those for the anion exchanger Dowex 1.

†Research sponsored by U.S. Energy Research and Development Administration under contract with Union Carbide Corporation.

111. The effects of faults in activated carbon beds on gas adsorption efficiency

L. A. Jonas and H. M. Berlin (*Edgewood Arsenal, Aberdeen Proving Ground, MD 21010, U.S.A.*). The effect of faults in a packed bed of activated carbon on gas adsorption efficiency was studied modeling the bed as a multiplicity of parallel carbon channels. Faulty channel effects on the concentration breakthrough depend on their percentage of the total bed, and are shown for the range 0·1–10%.

112. Preparation and properties of granular activated carbons from oil sands bitumen and petroleum residues

S. Parkash and N. Berkowitz (*Fuel Sciences Division, Alberta Research Council, Edmonton, Alberta, Canada T6G 2C2*). Steam- and CO_2-activation of charred oil sands bitumen and petroleum residues at 900°C for 3–4 hr produces granular carbons that compare favourably with currently marketed high-grade carbons from other sources. This paper outlines the preparation of the carbons, and reports the sorptive properties, pore structure and performance of variously activated carbons in standard decolorization tests.

VIII. FIBERS AND COMPOSITES

113. Diamagnetic studies on carbon fiber graphitization

G. B. Mellinger and D. B. Fischbach (*Dept. of Min., Met. & Ceramic Engineering FB-10, University of Washington, Seattle, WA 98195, U.S.A.*). With increasing isochronal treatment temperature, diamagnetism develops suddenly $\simeq$ 1700°C in PAN-based fibers; thereafter, graphitization (trace susceptibility) behavior is nearly identical but anisotropy development varies appreciably for fibers of various grades and origins. For fibers from pitch, rayon and PAN, $190 \leq \Delta H \leq 250$ kcal/mole in the 1950–2400°C isothermal treatment range.

114. Carbon aircraft brakes—a description

F. P. Kirkhart (*Goodyear Aerospace Corporation, Akron, OH, U.S.A.*). Carbon materials have been adapted for the primary heat sink in aircraft brake application. Carbon/carbon composites have qualified for use on four aircraft and have successfully absorbed energy up to one million ft-lbs per pound of carbon. Advantages over conventional steel brakes are associated with both weight and performance.

115. Toughness of advanced composites

G. C. Chang (*U.S. Naval Academy, Annapolis, MD, U.S.A.*). Most advanced composite materials studied are found to be relatively brittle, with the possible exception of S-glass/epoxy. Their experimental and theoretical toughness (impact strength or fracture toughness) values are only small fractions of those of conventional metallic materials. Some ways of improving composite toughness are discussed, too.

116. Activated carbon fibers and fabrics

R. N. Macnair, G. N. Arons and L. G. Coffin (*U.S. Army Natick Laboratories, CE&ME Laboratory, Natick, MA*). Inherently weak activated carbon fibers in the form of yarns were woven and knit into experimental fabrics with uncarbonized cotton and Nomex yarns. Resulting fabrics were strong and highly sorptive. Their strength, air permeability and thickness were much greater than those of activated all-carbon fabrics.

117. The compressive strength of carbon felt/pyrocarbon composites

J. Hill (*AWRE, MOD(PE), Aldermaston, Berks, U.K.*). A shear failure model was used to describe the compressive strength of carbon felt/pyrocarbon composites over a large range of density (0·3–1·9 g/ml). The compressive strength was described by

$$\sigma = (1 - 2R + R_2)/(1 + R)\exp(5{\cdot}01 - 0{\cdot}0241 Lc)\ \text{psi}$$

where the pre-exponential term is a function of density and Lc is the crystallite size of the deposited pyrocarbon.