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Standard Terminology Relating to Catalysts and Catalysis[1]

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1. Scope

1.1 This terminology covers definitions of terms related to catalysts and catalysis.

NOTE 1—The Manual of Symbols and Terminology for Physicochemical Quantities and Units presents authoritative descriptions of many terms used in the field of catalysis.[2]

2. Terminology

2.1 *Definitions:*

activity, *n—of a catalyst,* the measure of the rate of a specific catalytic reaction conducted in the presence of a catalyst.

calcine, *v—in catalysis*, to heat a material to a high temperature causing a physical or chemical change, for example, loss of moisture and volatile matter, or a phase change, or both.

catalyst bed support, *n*—an essentially inert plate, grid, particulate bed, or other structural component designed to hold up or bear a quantity of catalyst in a catalytic reactor.

catalyst carrier, *n*—a solid, generally porous material upon the surface or into the voids of which catalytic materials are placed to create the desired catalyst.

DISCUSSION—A carrier may have or contribute to catalytic activity.

catalyst substrate, *n*—less preferred alternative term for **catalyst carrier**.

catalyst support, *n*—less preferred alternative term for **catalyst carrier**.

crush strength, *n—in catalysis*, a measure of the resistance of formed catalysts or catalyst carriers, either singly or in bulk, to loss of form when subjected to a compressive force.

DISCUSSION—Formed catalysts may include tablets, spheres, extrudates, rings, pellets, etc. and should be distinguished from powders and granules.

density, packing (bulk), *n*—the ratio of the mass of a collection of discrete pieces of solid material to the sum of the volumes of: the solids in each piece, the voids within the pieces, and the voids among the pieces of the particular collection.

density, particle (envelope), *n*—the ratio of the mass of a particle to the sum of the volumes of: the solid in each piece and the voids within each piece, that is, within close-fitting imaginary envelopes completely surrounding each piece.

density, skeletal, *n*—the ratio of the mass of discrete pieces of solid material to the sum of the volumes of: the solid material in the pieces and closed (or blind) pores within the pieces.

density, theoretical, *n*—the ratio of the mass of a collection of discrete pieces of solid material to the sum of the volumes of said pieces, the solid material having an ideal regular arrangement at the atomic level.

envelope, *n—of a particle in catalysis*, a theoretical surface that encloses the particle and that bridges openings to the interior of the particle.

pore, *n—in catalysis*, a small opening in a material permitting admission, adsorption, or passage of a fluid.

pore size distribution, *n— in catalysis*, the volume of pores of a material expressed or displayed as a function of pore diameters.

pore volume distribution, *n—in catalysis*, an alternative term for pore size distribution.

porosity, *n—of particles in catalysis*, the ratio of the volumes of the pores in the particles to the volumes enclosed by their envelopes.

selectivity, *n—of a catalyst*, the measure of the distribution of products in a specific reaction conducted in the presence of a catalyst.

sintering, *n—in catalysis*, a reduction of the surface area of a catalyst carrier or other solid catalytic material caused by heat.

DISCUSSION—Sintering may be enhanced by steam or other chemical species and may be accompanied by changes in crystallinity.

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[1] This terminology is under the jurisdiction of ASTM Committee D32 on Catalysts and is the direct responsibility of Subcommittee D32.92 on Nomenclature and Definitions.

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[2] "The Manual of Symbols and Terminology for Physicochemical Quantities and Units—Appendix II. Definitions, Terminology and Symbols in Colloid and Surface Chemistry. Part II: Heterogeneous Catalysis," Pure and Applied Chemistry, Vol 46, No. 1, 73–90(1976).

surface area, *n*— *in catalysis*, the measure of the total surface of a material per unit mass or volume.

DISCUSSION—This is usually expressed as m^2/g or m^2/cm^3 and is also sometimes called *specific surface area*.