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Standard Terminology Relating to Catalysts and Catalysis¹

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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

1.2 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Terminology

2.1 Definitions:

abrasion, *n*—the gradual removal of material from a surface due to friction typically generating fine particles. Note: **abrasion** and **attrition** are often used interchangeably.

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

attrition, *n*—the wearing down of particles by grinding against each other producing chips and fine particles. Note: **abrasion** and **attrition** are often used interchangeably.

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.

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).

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**.

conversion, *n*—the amount of a feed reagent consumed relative to the total amount of the reagent fed to the reactor. Calculated as the difference between the molar flowrate of the reagent fed to the reactor minus the molar flowrate from the reactor, divided by the molar flowrate fed to the reactor.

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.

fragmentation, *n*—the breaking of a solid catalytic material into two or more smaller particles.