



NANOCAT® ZINC POWDER DRY

PRODUCT IDENTIFICATION

Identification label: **ZINC POWDER DRY**. Chemical name: zinc powder, chemical formula: Zn; spontaneously flammable when exposed to water. This powder was prepared by electric explosion of a metallic wire in argon, it was then packaged in glass ampoules.

CHEMICAL COMPOSITION

Material: zinc not less 98%, the balance is zinc oxide and adsorbed gases - CH₄, CO₂, Ar, N₂. When exposed to water, metal content reduces to 85-90% with the balance of sorbed gases, zinc oxide and H₂O.

PHYSICAL AND CHEMICAL PROPERTIES

Appearance and color: gray or dark-gray powder. The bulk density is about 1 g/cm³. Particles of a powder start to conglomerate at temperature ≥ 30 °C. Dry particles readily agglomerates – Fig. 1. When sonicated in the form of either alcohol or other organic solvent suspension, agglomerates are destructed to nanoparticles (Fig.2). Probabilistic (arithmetic mean) particle size $\tilde{a}_n = 36$ nm; surface area mean size $\tilde{a}_s = 52$ nm; mass mean size - $\tilde{a}_m = 72$. Isolated particles are of irregular shape. BET surface area of dry powder is 5.34 m²/g. The particle size distribution bar chart of dry powder is shown in Fig.3, the same after ultrasonic de-agglomeration is in Fig.4

The powder reacts with water at boiling point and causes release of hydrogen. Ignites in air if exposed to open fire. Zinc exothermically reacts with oxygen-containing liquids, halogen organics and other oxidizers. Zinc is stable in dry air if heated to 60°C. Ignition point is about 320°C. Zinc powder can find its application in materials sciences and electronics.

HEALTH HAZARD

Toxicity: zinc powder causes general toxic and irritating effect, sweet taste in a mouth, dry throat, coughing, nausea, vomiting and irritation of the mucous tunics. Threshold concentration of chronic action is 5 mg/m³. Toxic dose – 150-600mg. Recommend limiting concentration: 0.1 mg/m³; dangerous concentration: 5 mg/m³.

SAFE HANDLING

Use health protection measures commonly used in working with readily flammable solids. Wear respirators. Keep off water and do not heat above 320°C.

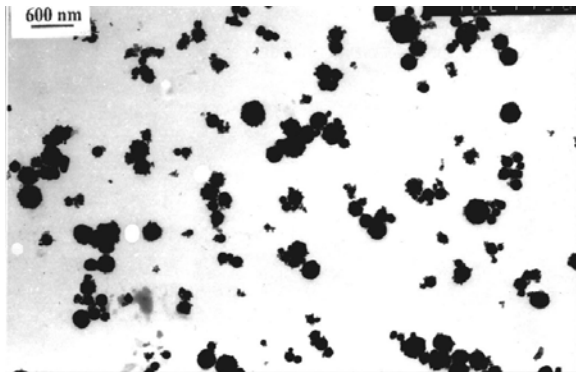


Fig.1 Zinc powder microagglomerates.

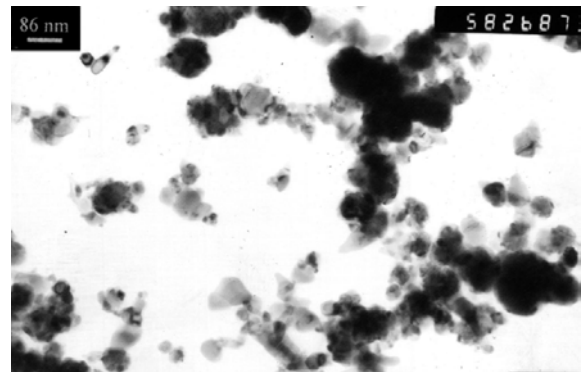


Fig.2 Zinc powder nanoparticles.

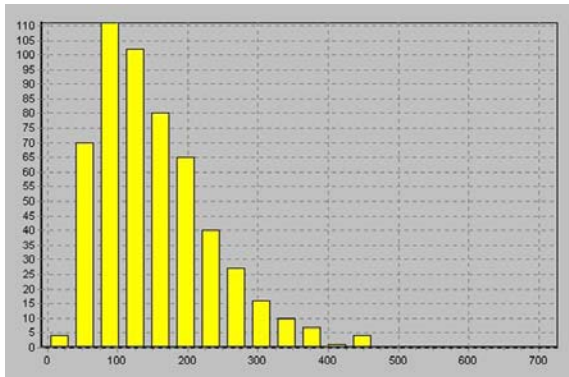


Fig.3 Particle size distribution for Zinc powder microagglomerates. X-axis: particle size in nm; Y-axis: number of particles.

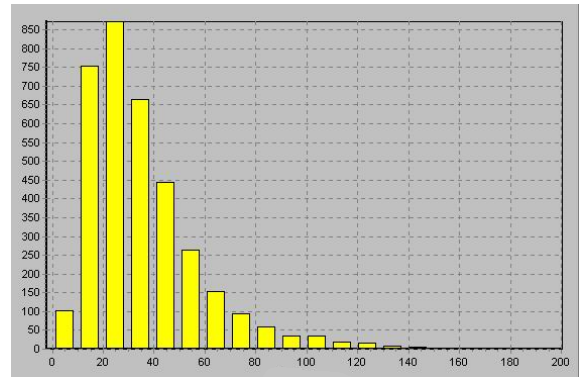


Fig.3 Particle size distribution for Zinc powder nanoparticles. X-axis: particle size in nm; Y-axis: number of particles.

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