

**NLM Catalyst Alumina**

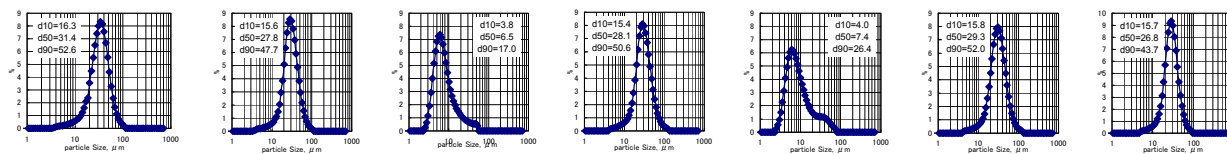


Print date: March 23, 2009

| Grade       |                | C10             | C20      | C20-B    | C20L     | C20L-B   | C40      | C50      |
|-------------|----------------|-----------------|----------|----------|----------|----------|----------|----------|
| Phase       |                | pseudo-boehmite | $\gamma$ | $\gamma$ | $\gamma$ | $\gamma$ | $\theta$ | $\alpha$ |
| Composition |                |                 |          |          |          |          |          |          |
| Solids      | %              | 73              | 95       | 95       | 96       | 96       | 98       | 99       |
| La2O3       | %, oxide basis | -               | -        | -        | 4.0      | 4.0      | -        | -        |
| Impurities  |                |                 |          |          |          |          |          |          |
| Na2O        | %, oxide basis | 0.02            | 0.02     | 0.03     | 0.03     | 0.03     | 0.02     | 0.02     |
| SiO2        | %, oxide basis | 0.03            | 0.04     | 0.04     | 0.04     | 0.04     | 0.04     | 0.04     |
| Fe2O3       | %, oxide basis | 0.01            | 0.01     | 0.02     | 0.01     | 0.01     | 0.01     | 0.01     |
| Cl          | %              | 0.001           | 0.001    | 0.001    | 0.001    | 0.001    | 0.001    | 0.001    |
| S           | %              | 0.1             | 0.1      | 0.2      | 0.3      | 0.3      | 0.1      | 0.1      |

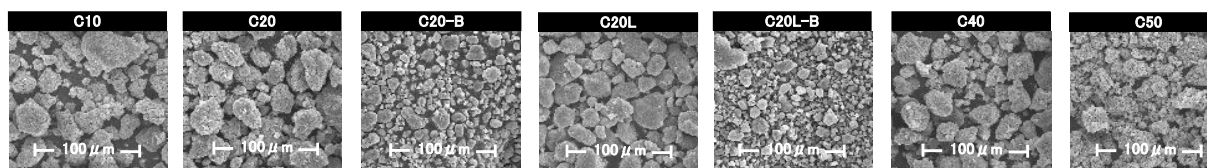
Particle Size

Particle Size Distribution Plots

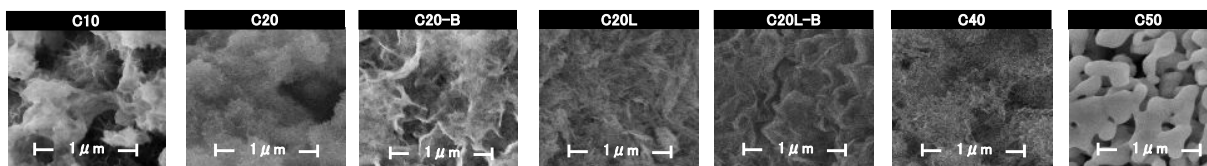


Morphology

Scanning Electron Micrographs ( x 500)



Scanning Electron Micrographs ( x 50,000)



As-Received Textural Properties

|                     |                    | C10  | C20  | C20-B | C20L | C20L-B | C40  | C50 |
|---------------------|--------------------|------|------|-------|------|--------|------|-----|
| surface area        | m <sup>2</sup> /g  | 270  | 240  | 170   | 190  | 170    | 100  | 7   |
| pore volume         | cm <sup>3</sup> /g | 0.45 | 0.66 | 0.80  | 0.75 | 1.00   | 0.59 | -   |
| ave. pore diameter* | nm                 | 4.5  | 8.5  | 13.0  | 12.7 | 15.0   | 17.0 | -   |

Other Properties

|                     |  | C10  | C20  | C20-B | C20L | C20L-B | C40  | C50  |
|---------------------|--|------|------|-------|------|--------|------|------|
| loose bulk density  |  | 0.52 | 0.44 | 0.25  | 0.26 | 0.21   | 0.43 | 0.52 |
| packed bulk density |  | 0.59 | 0.50 | 0.26  | 0.34 | 0.23   | 0.50 | 0.70 |