Cobalt Dihydroxide- Additional Particle Size Distribution and Specific Surface Area Measurements

The Cobalt Institute (CI) commissioned DMT (Essen, Germany) and My-TEC (Germany) to conduct the following tests on three separate samples (three different manufacturers) of refined cobalt dihydroxide powders to provide standardised particle size distribution results and to further determine the representativeness of the sample tested for the endpoint of acute toxicity (EU REACH) to the other refined cobalt dihydroxide products:

1. Laser Diffraction (ISO 13320) – Dry Suspension
2. Laser Diffraction (ISO 13320) – Liquid Suspension (hexane)
3. Laser Diffraction (ISO 13320) – Liquid Suspension (acetone)
4. BET (Specific Surface Area) (ISO 9277)

Table 1. Summary of Particle Size Distribution and Specific Surface Area Analysis of Three Refined Cobalt Dihydroxide Powders

	Refined Co Dihydroxide 1	**Refined Co Dihydroxide 2** ***Sample used for Acute Tox Testing***	**Refined Co Dihydroxide 3**
Laser Diffraction (Dry powder)	D10 ~ 0.5 µm D50 ~ 8.1 µm D90 ~ 14.6 µm	D10 ~ 0.2 µm D50 ~ 1.1 µm D90 ~ 22.1 µm	D10 ~ 0.2 µm D50 ~ 1.5 µm D90 ~ 22.6 µm
Laser Diffraction (Hexane)	D10 ~ 6.4 µm D50 ~ 12.7 µm D90 ~ 22.1 µm	D10 ~ 8.8 µm D50 ~ 34.1 µm D90 ~ 77.3 µm	D10 ~ 5.5 µm D50 ~ 20.7 µm D90 ~ 55.9 µm
Laser Diffraction (Acetone)	D10 ~ 7.3 µm D50 ~ 11.9 µm D90 ~ 18.0 µm	D10 ~ 1.6 µm D50 ~ 31.4 µm D90 ~ 67.1 µm	D10 ~ 1.2 µm D50 ~ 18.6 µm D90 ~ 63.3 µm
BET (m^2/g)	6.398	19.607	19.297
BET (m^2/cm^3)	12.25	38.44	37.90

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Appendix 1. Particle Size Distribution Analysis

Cobalt Dihydroxide 1

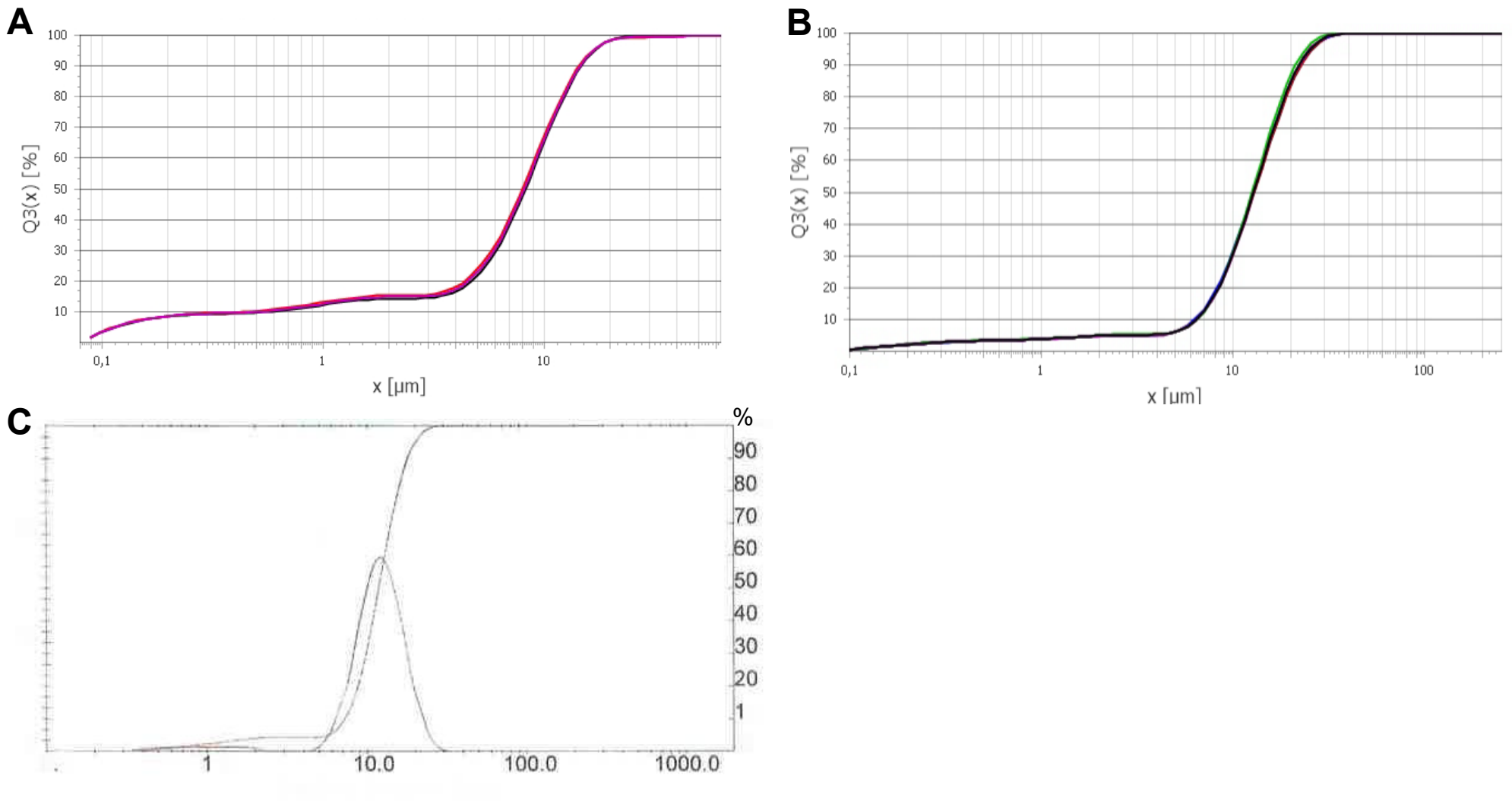

Figure 1. Cobalt Dihydroxide 1: Laser Diffraction Results- Dry powder (A); Laser Diffraction Results- Hexane (B); Laser Diffraction Results- Acetone (C)

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Cobalt Dihydroxide 2

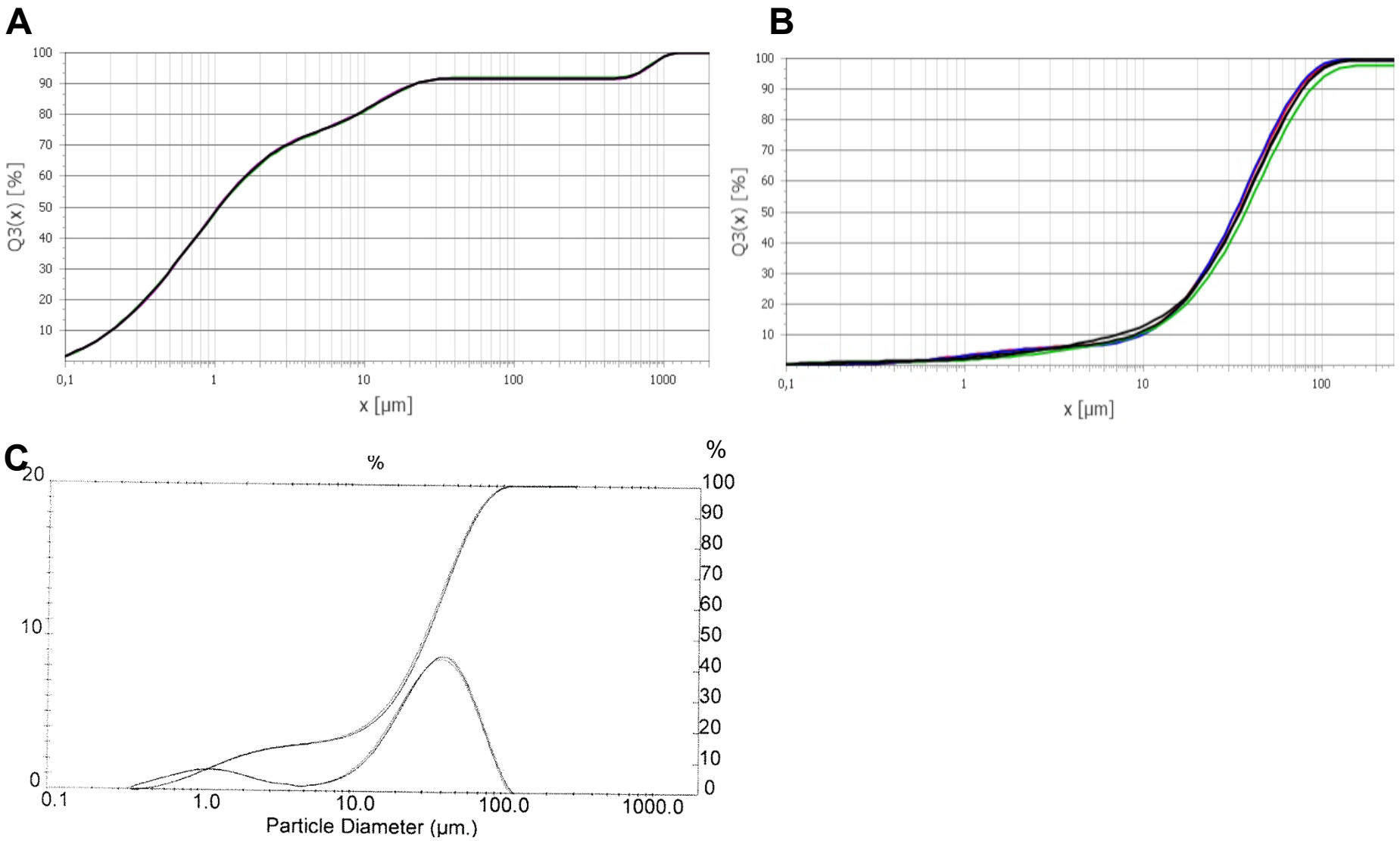

Figure 2. Cobalt Dihydroxide 2: Laser Diffraction Results – Dry powder (A); Laser Diffraction Results- Hexane (B); Laser Diffraction Results- Acetone (C)

Cobalt Dihydroxide- Additional Particle Size Distribution and Specific Surface Area Measurements

Cobalt Dihydroxide 3

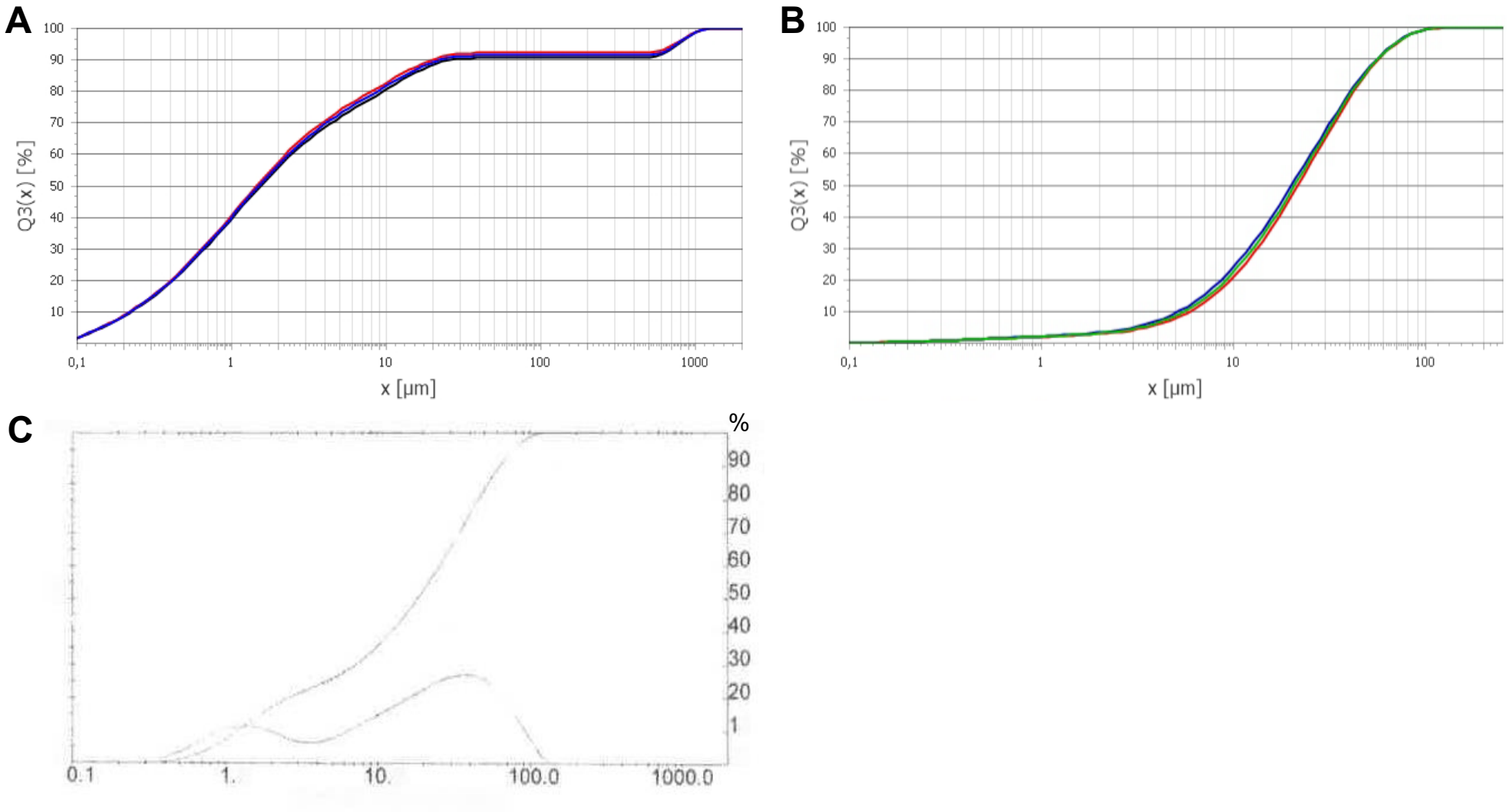

Figure 3. Cobalt Dihydroxide 3: Laser Diffraction Results – Dry powder (A); Laser Diffraction Results- Hexane (B); Laser Diffraction Results- Acetone (C)