



Technical Data Sheet (TDS)

Product Name: XT 20% Silver on Vulcan XC-72R Grade S

Fuel Cell Store SKU Numbers: 11080056, 11080057, 11080058

Form: Fine powder

Application: Catalyst for electrochemical applications and other R&D use cases

1. General Information

Parameter	Specification
Appearance	Fine, porous black powder
Composition (wt%)	~ 20 wt% Ag, ~80 wt% Carbon support
Support	Vulcan XC-72R carbon black
Molecular Formula	Not applicable (heterogeneous composite)
Metal Purity	≥ 99.9 % (Ag metal basis)
Storage	Store in a tightly sealed, antistatic container under dry conditions at room temperature.

2. Physical Properties

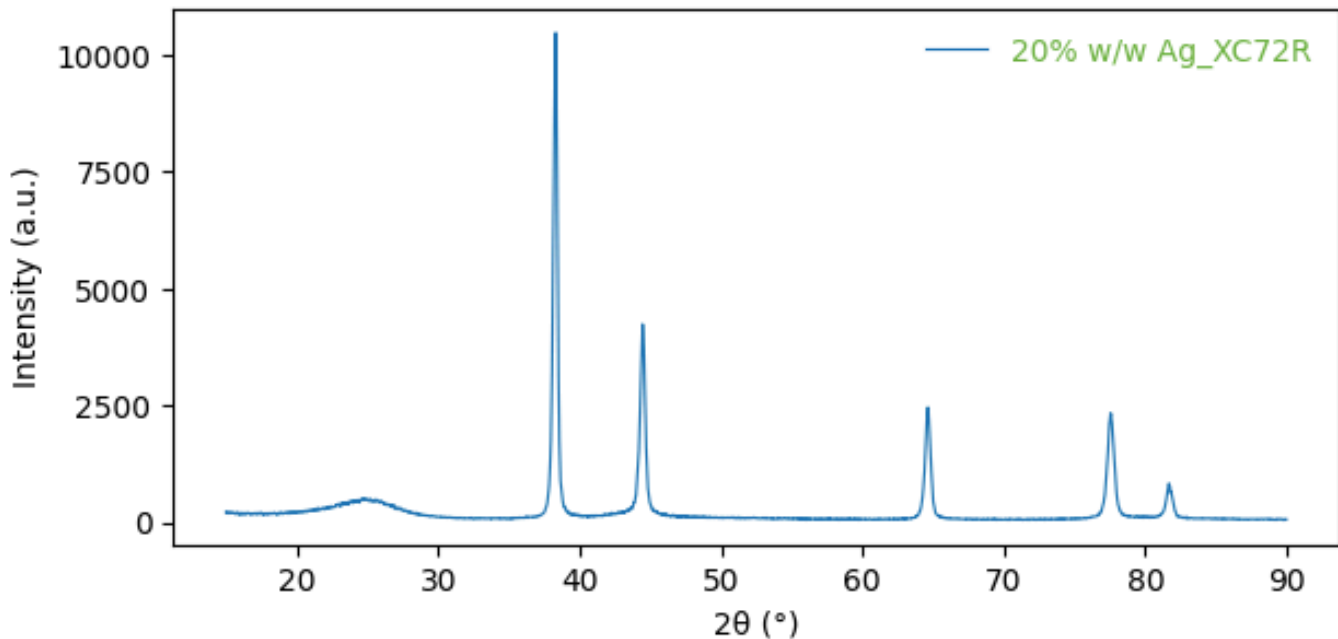
Property	Value
Particle Morphology	Nanocrystalline Ag clusters uniformly dispersed on high-surface-area carbon
Average Particle Size	34.7 μm (D_{50} , Laser Diffraction)
Particle Size Range	μm (D_{10} – D_{90})
BET Surface Area	In the range of 160 - 190 m^2/g
Bulk Density	~0.15-0.25 g/cm^3
Color	Black

3. Structural Characterization (X-ray Diffraction)

Phase Identified:

- **Structure** : Face-centered cubic (fcc) Silver (0)
 - **Database Reference:** COD Card No. (9011607); JCPDS No. (04-0783)
 - **Space Group** : *Fm-3m*
 - **Secondary Phases** : None detected
-

- **Instrument:** Rigaku MiniFlex 300/600
- **Cu-K α radiation** ($\lambda = 1.5406 \text{ \AA}$ | **scan rate:** 0.5°/min | **step size:** 0.02°(2 θ),
- **2 θ range:** 10–90° | **optics:** Monochromator



Selected Diffraction Peaks:

hkl Plane	2θ (°)	d-spacing (Å)	FWHM (°)	Crystallite Size (nm)	Relative Intensity (%)
(111)	38.30	2.348	0.32	27.8	100.0
(200)	44.45	2.036	0.37	24.2	50.21
(220)	64.63	1.441	0.38	25.9	29.94

Lattice Parameters:

Parameter	Value (Å/°)
a = b = c	4.07394 Å
α, β, γ	90°

Bond Distances:

- Ag-Ag nearest-neighbour distance: 2.88071 Å
- Consistent with FCC 12-fold cubic coordination.

4. Surface Area Analysis (BET)

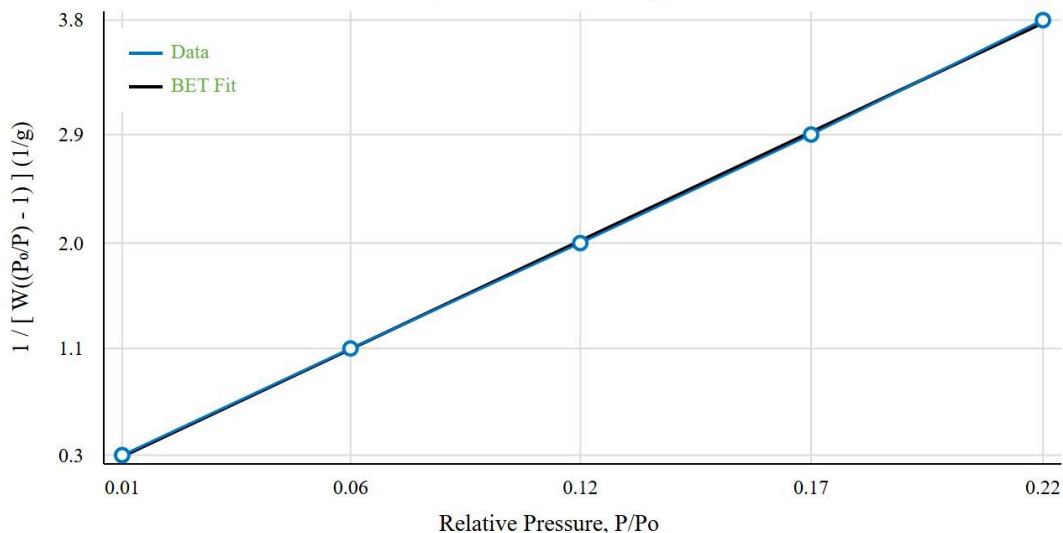
Instrument: Anton Paar QuantaChrome NOVA

Adsorption gas: N₂, Bath temperature: 77.3 K

- Degassing Conditions: **4 hrs, 100°C**
Sample Weight: **0.2934 g**
Sample Volume: **0.07523 cc**
Equilibration Time: **60 sec (adsorption/desorption)**
Relative Pressure Range (P/P₀): **~0.021 – 0.22**
Analysis Time: **81.9 minutes**



Multi-Point BET Plot



BET Results Summary:

BET surface area for this particular production batch: **178.454 m²/g**,

C constant: 427.727,

slope: 19.469 (1/g),

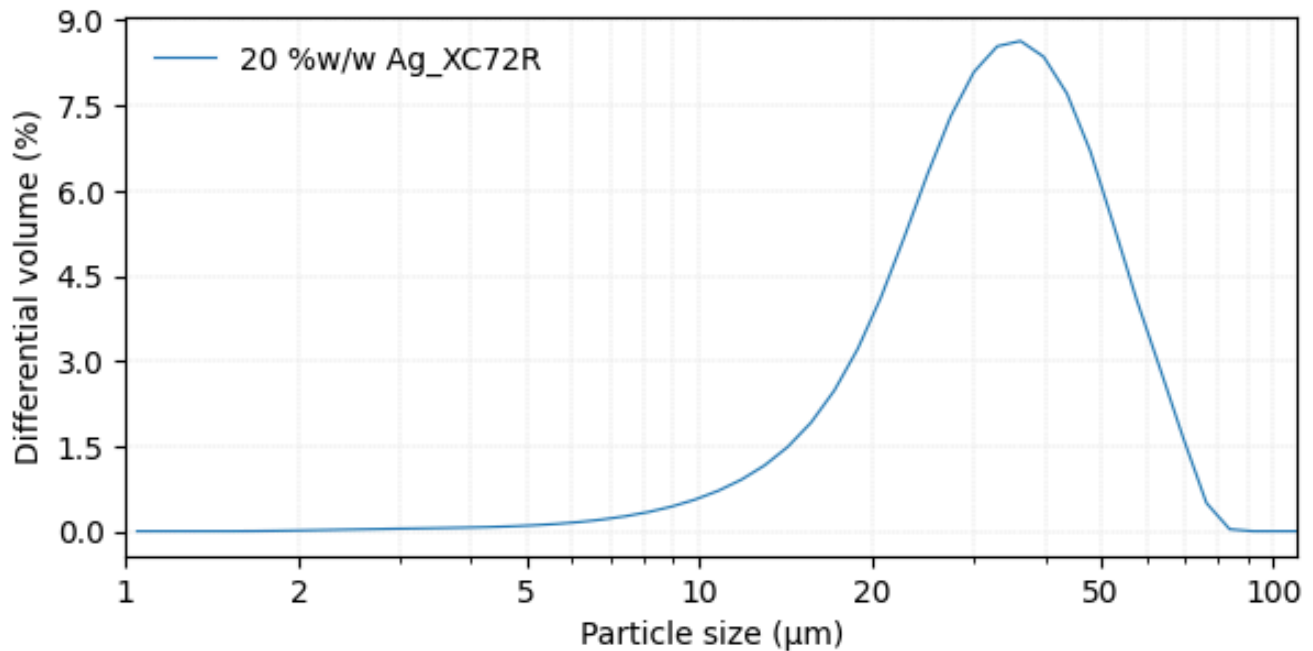
intercept: 0.0456 (1/g),

correlation coefficient (r²): 0.9999

5. Particle Size Distribution (Laser Diffraction):

Instrument: Beckman Coulter LS 13 320 | **Fluid:** Water

Measurement Type: Average of 3 runs



Percentile Values:

- **D₁₀: 17.96 µm**
 - **D₂₅: 25.40 µm**
 - **D₅₀: (Median): 34.69 µm**
 - **D₇₅: 45.84 µm**
 - **D₉₀: 56.93 µm**
-



6. Handling and Safety

- **PPE:** nitrile gloves, P-100/N95 dust mask, safety goggles.
- **Exposure:** avoid inhalation or skin/eye contact.
- **Ventilation:** Work in a fume hood or well-ventilated area to limit airborne dust.
- **Combustion risk:** carbon support is combustible; silver nanoparticles can catalyse oxidation. Keep away from strong oxidisers, sparks, and open flames.
- **Disposal:** follow local regulations; recycle the silver content whenever feasible.