XT CATALYST

FUEL CELLS ETC
COMMERCIAL FUEL CELL COMPONENTS

Technical Data Sheet (TDS)

Product Name: XT 50% Platinum on Vulcan XC-72R Grade S
Fuel Cell Store SKU Numbers: 11080115, 11080116, 11080117
Form: Fine powder
Application: Electrocatalyst for electrochemical device applications

1. General Information

Parameter	Specification
Appearance	Fine, porous black powder
Composition (wt%)	~ 50 wt% Pt, ~50 wt% Carbon support
Support	Vulcan XC-72R carbon black
Molecular Formula	Not applicable (heterogeneous composite)
Metal Purity	≥ 99.9 % (Pt metal basis)
Storage	Store in a tightly sealed, antistatic container under dry conditions at room temperature. Air-sensitive nanopowders can be stored under dry and inert atmosphere conditions in order to prevent or minimize their surface oxidation.

2. Physical Properties

Property	Value
Particle Morphology	Nanocrystalline Pt clusters uniformly dispersed on high-surface-area carbon
Average Particle Size	13.84 µm (D_{50}, Laser Diffraction)
Particle Size Range	µm (D_{10} – D_{90})
BET Surface Area	136 - 156 m^2/g
Bulk Density(loose Powder)	~0.21 - 0.32 g/cm^3
Color	Black

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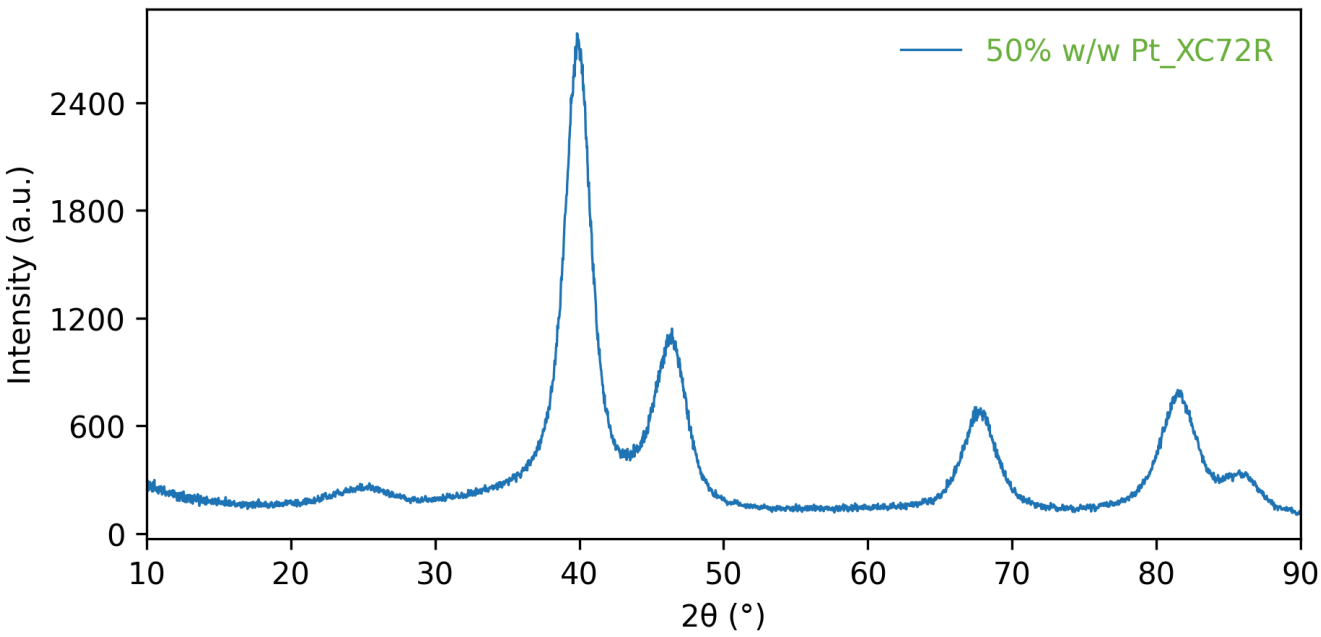
3. Structural Characterization (X-ray Diffraction)

Phase Identified:

- **Structure** : Face-centered cubic (fcc) Platinum (0)
- **Database Reference:** COD Card No. (1011114); JCPDS No. (04-0802)
- **Space Group** : *Fm-3m*
- **Secondary Phases** : None detected

- **Instrument:** Rigaku MiniFlex 300/600
- **Cu-Kα radiation** (λ = 1.5406 Å **| scan rate:** 0.5°/min **| step size:** 0.02°(2θ),
- **2θ range:** 10–80° **| optics:** Monochromator



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Selected Diffraction Peaks:

hkl Plane	2θ (°)	d-spacing (Å)	FWHM (°)	Crystallite Size (nm)	Relative Intensity (%)
(111)	39.87	2.259	2.15	4.10	100.0
(200)	46.28	1.963	2.67	3.39	41.17
(220)	67.66	1.383	2.78	3.60	28.30

Lattice Parameters:

Parameter	Value (Å/°)
a = b=c	3.9146 Å
α, β, γ	90°

Bond Distances:

- Pt–Pt nearest-neighbor distance: 2.7681 Å
- Consistent with FCC 12-fold cubic coordination.

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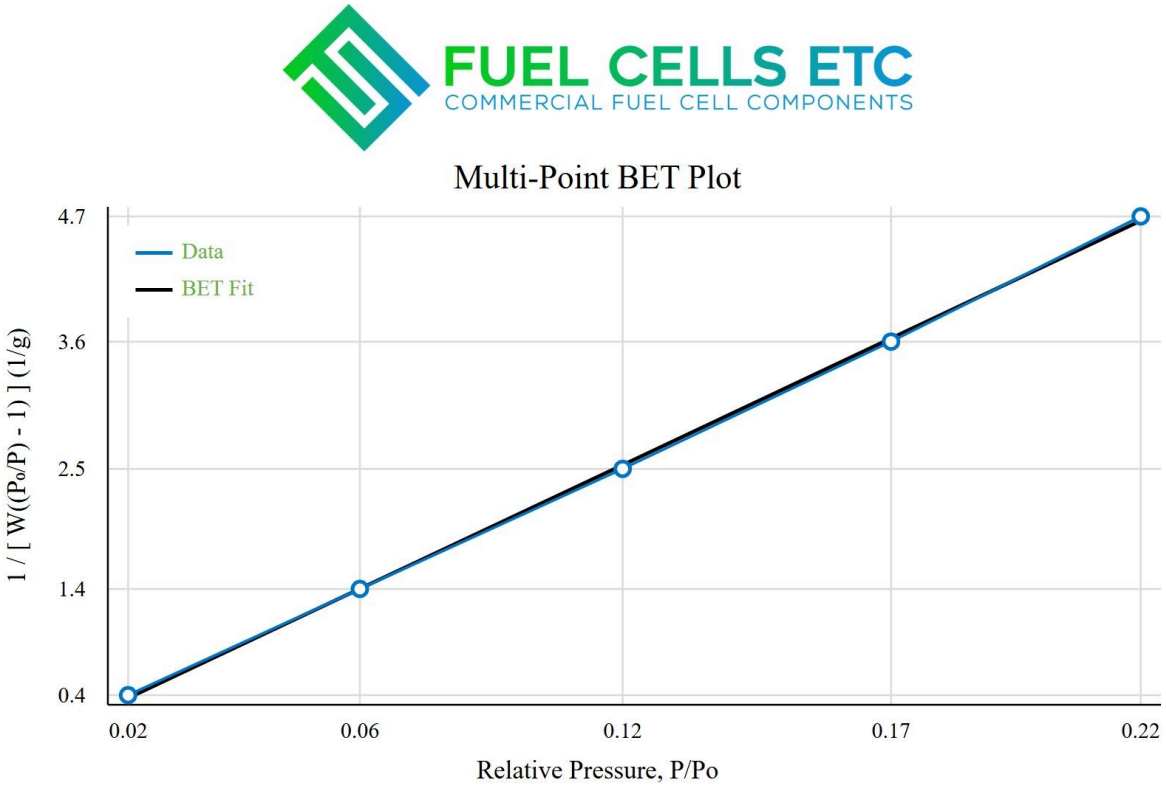
4. Surface Area Analysis (BET)

Instrument: Anton Paar QuantaChrome NOVA

Adsorption gas: N_2, Bath temperature: 77.3 K

- Degassing Conditions: **4 hrs, 100°C**
  Sample Weight: **0.2994 g**
  Sample Volume: **0.07677 cc**
  Equilibration Time: **60 sec (adsorption/desorption)**
  Relative Pressure Range (P/Po): **~0.018 – 0.22**
  Analysis Time: **112.8 minutes**



BET Results Summary:

BET surface area for this particular production batch: **146.547 m²/g,**
C constant: 265.954,
slope: 23.674 (1/g),
intercept: 0.0893 (1/g),
correlation coefficient (r^2): 0.99999

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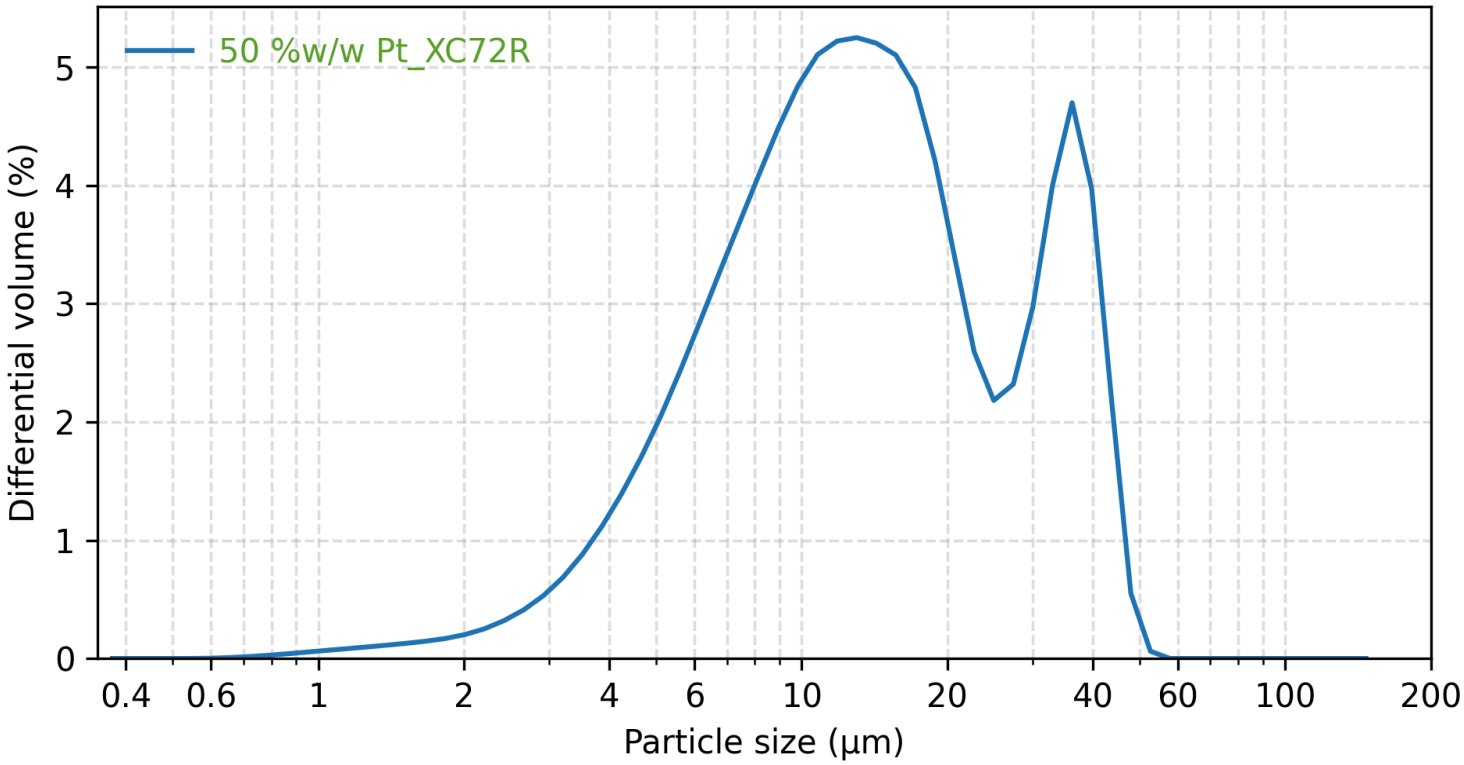
5. Particle Size Distribution (Laser Diffraction):

Instrument: Beckman Coulter LS 13 320 | **Fluid:** Water
Measurement Type: Average of 3 runs



Percentile Values:

- D_{10}: **5.48 µm**
- D_{25}: **8.59 µm**
- D_{50}: **(Median): 13.84 µm**
- D_{75}: **23.21 µm**
- D_{90}: **37.36 µm**

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6. Handling and Safety

- Use appropriate PPE: gloves, dust mask, safety goggles.
- Avoid inhalation or contact with skin and eyes.
- Handle in a fume hood or well-ventilated area to minimize airborne dust.
- Keep away from strong oxidizers and open flames; carbon powders are combustible, and noble-metal particles can catalyze exothermic reactions.
- Dispose of material according to local regulations.

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