



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 14, 2020 – 04:20 PM BST

PDB ID : 6Z4O
Title : A4V mutant of human SOD1 bound with benzyl benzoisoselenazolone derivative 1 in P21 space group
Authors : Ampornpanai, K.; Hasnain, S.S.
Deposited on : 2020-05-25
Resolution : 1.40 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : **FAILED**
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.14.4.dev1

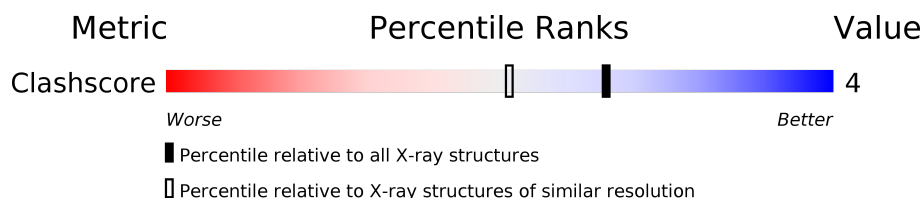
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.40 Å.


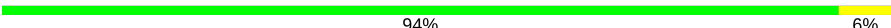
Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	1812 (1.40-1.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$

Note EDS failed to run properly.

Mol	Chain	Length	Quality of chain
1	AAA	153	 92% 8%
1	BBB	153	 94% 6%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 2561 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Superoxide dismutase [Cu-Zn].

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	AAA	153	Total	C	N	O	S	0	7	0
			1141	699	203	235	4			
1	BBB	153	Total	C	N	O	S	0	6	0
			1139	698	203	234	4			

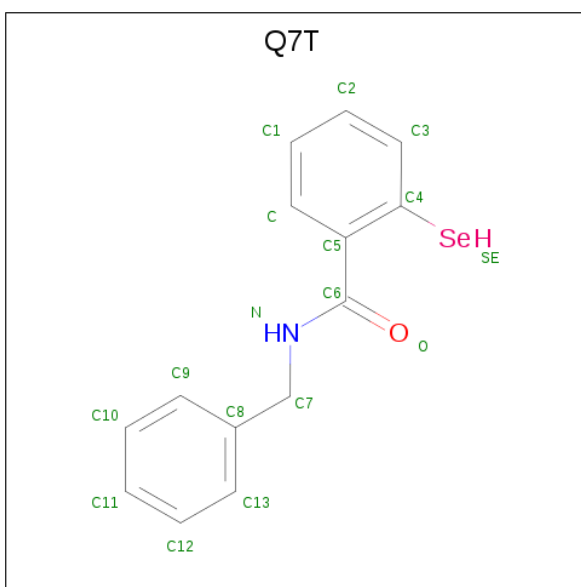
There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
AAA	4	VAL	ALA	engineered mutation	UNP P00441
BBB	4	VAL	ALA	engineered mutation	UNP P00441

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	BBB	2	Total	Zn	0	0
			2	2		
2	AAA	2	Total	Zn	0	0
			2	2		

- Molecule 3 is {N}-(phenylmethyl)-2-selanyl-benzamide (three-letter code: Q7T) (formula: C₁₄H₁₃NOSe) (labeled as "Ligand of Interest" by author).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	AAA	1	Total	C	N	O	Se	0	0
			17	14	1	1	1		
3	BBB	1	Total	C	N	O	Se	0	0
			17	14	1	1	1		

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	AAA	1	Total	O S	0	0
			5	4 1		
4	BBB	1	Total	O S	0	0
			5	4 1		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	BBB	1	Total	O	S	0	0
			5	4	1		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	AAA	103	Total	O	0	0
			103	103		
5	BBB	125	Total	O	0	0
			125	125		

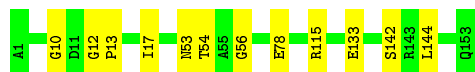
3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

Note EDS failed to run properly.

- Molecule 1: Superoxide dismutase [Cu-Zn]

Chain AAA:  92% 8%



- Molecule 1: Superoxide dismutase [Cu-Zn]

Chain BBB:  94% 6%



4 Data and refinement statistics

EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	38.34Å 67.95Å 50.46Å 90.00° 105.54° 90.00°	Depositor
Resolution (Å)	48.61 – 1.40	Depositor
% Data completeness (in resolution range)	99.8 (48.61-1.40)	Depositor
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.85 (at 1.35Å)	Xtriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.208 , 0.232	Depositor
Wilson B-factor (Å ²)	14.9	Xtriage
Anisotropy	0.409	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2561	wwPDB-VP
Average B, all atoms (Å ²)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 13.79% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, Q7T, SO4

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	AAA	0.80	0/1168	0.93	1/1577 (0.1%)
1	BBB	0.77	0/1169	0.89	0/1578
All	All	0.79	0/2337	0.91	1/3155 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	AAA	115	ARG	NE-CZ-NH2	-7.15	116.72	120.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	AAA	1141	0	1089	9	0
1	BBB	1139	0	1092	9	0
2	AAA	2	0	0	0	0
2	BBB	2	0	0	0	0
3	AAA	17	0	0	2	0
3	BBB	17	0	0	3	0
4	AAA	5	0	0	0	0
4	BBB	10	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	AAA	103	0	0	2	0
5	BBB	125	0	0	4	0
All	All	2561	0	2181	18	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (18) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:AAA:78:GLU:OE2	5:AAA:301:HOH:O	1.79	0.99
3:AAA:202:Q7T:N	3:AAA:202:Q7T:SE	2.80	0.64
3:BBB:202:Q7T:O	3:BBB:202:Q7T:SE	2.70	0.60
1:BBB:136:LYS:HD3	5:BBB:327:HOH:O	2.04	0.56
1:AAA:17:ILE:HD13	1:BBB:54:THR:HG23	1.88	0.56
1:AAA:17:ILE:CD1	1:BBB:54:THR:HG23	2.38	0.54
1:AAA:133:GLU:OE2	1:AAA:133:GLU:HA	2.06	0.53
1:BBB:92[A]:ASP:OD2	5:BBB:301:HOH:O	2.18	0.53
1:BBB:30[A]:LYS:HG3	5:BBB:385:HOH:O	2.08	0.52
1:AAA:10:GLY:HA3	1:AAA:144:LEU:O	2.10	0.52
1:BBB:142:SER:HB2	5:BBB:302:HOH:O	2.09	0.52
1:BBB:107:SER:HA	3:BBB:202:Q7T:SE	2.62	0.48
3:AAA:202:Q7T:SE	3:BBB:202:Q7T:C	3.12	0.48
1:BBB:31:VAL:HB	1:BBB:99:ILE:HB	1.97	0.46
1:AAA:142:SER:HB2	5:AAA:375:HOH:O	2.15	0.45
1:AAA:53[B]:ASN:ND2	1:AAA:56:GLY:C	2.73	0.42
1:AAA:12:GLY:N	1:AAA:13:PRO:HA	2.35	0.41
1:AAA:54:THR:HG23	1:BBB:17:ILE:HD13	2.02	0.41

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

There are no protein backbone outliers to report in this entry.

5.3.2 Protein sidechains [i](#)

There are no protein residues with a non-rotameric sidechain to report in this entry.

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 9 ligands modelled in this entry, 4 are monoatomic - leaving 5 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
4	SO4	AAA	204	-	4,4,4	0.39	0	6,6,6	0.24	0
3	Q7T	BBB	202	1	18,18,18	5.62	3 (16%)	22,23,23	2.25	2 (9%)
3	Q7T	AAA	202	1	18,18,18	6.53	2 (11%)	22,23,23	1.49	3 (13%)
4	SO4	BBB	204	-	4,4,4	0.35	0	6,6,6	0.15	0
4	SO4	BBB	205	-	4,4,4	0.47	0	6,6,6	0.19	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	Q7T	AAA	202	1	-	4/9/9/9	0/2/2/2
3	Q7T	BBB	202	1	-	0/9/9/9	0/2/2/2

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	AAA	202	Q7T	SE-C4	-26.46	1.60	1.89
3	BBB	202	Q7T	SE-C4	-22.41	1.65	1.89
3	AAA	202	Q7T	C4-C5	7.68	1.50	1.40
3	BBB	202	Q7T	C4-C5	7.44	1.49	1.40
3	BBB	202	Q7T	C3-C4	2.18	1.43	1.38

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	BBB	202	Q7T	SE-C4-C3	8.63	128.18	119.47
3	AAA	202	Q7T	SE-C4-C3	4.89	124.41	119.47
3	BBB	202	Q7T	C3-C4-C5	-4.20	114.63	120.62
3	AAA	202	Q7T	O-C6-C5	-2.14	117.11	121.01
3	AAA	202	Q7T	C3-C4-C5	-2.04	117.71	120.62

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	AAA	202	Q7T	C4-C5-C6-O
3	AAA	202	Q7T	C4-C5-C6-N
3	AAA	202	Q7T	C5-C6-N-C7
3	AAA	202	Q7T	O-C6-N-C7

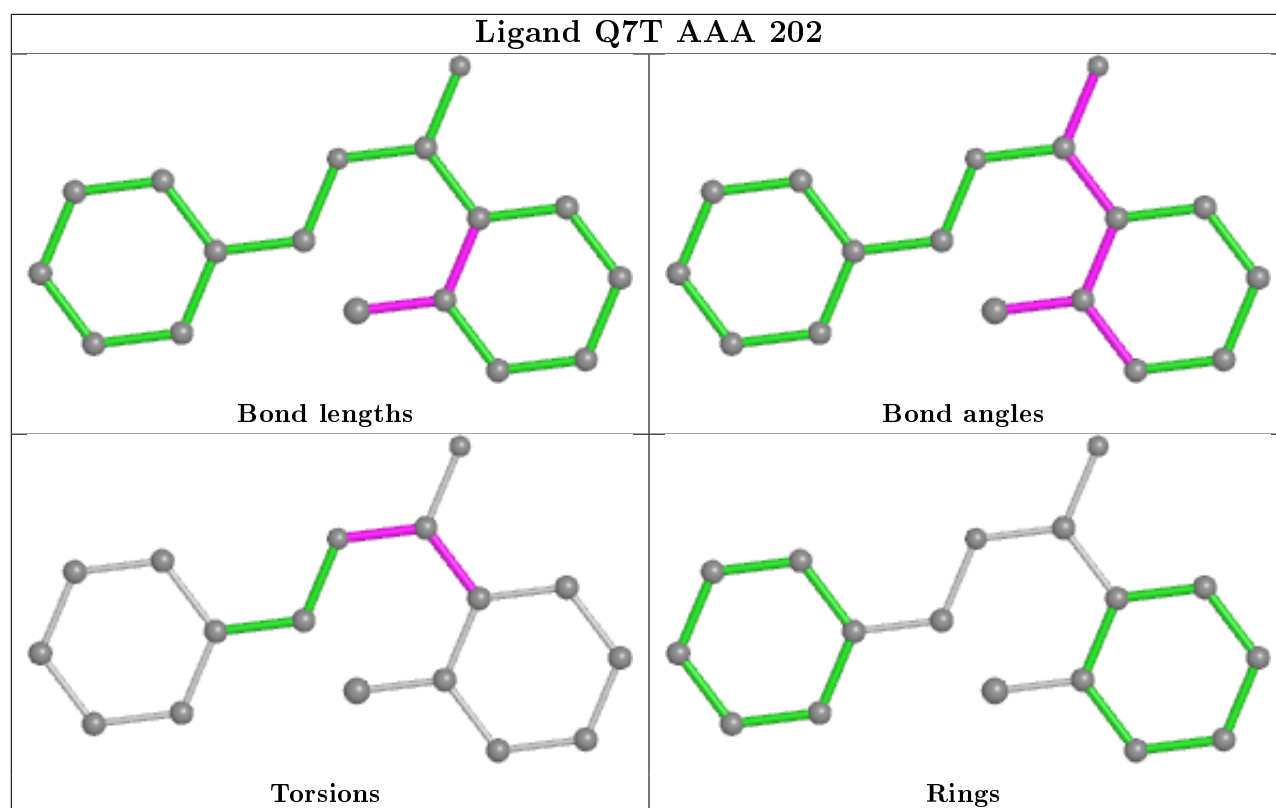
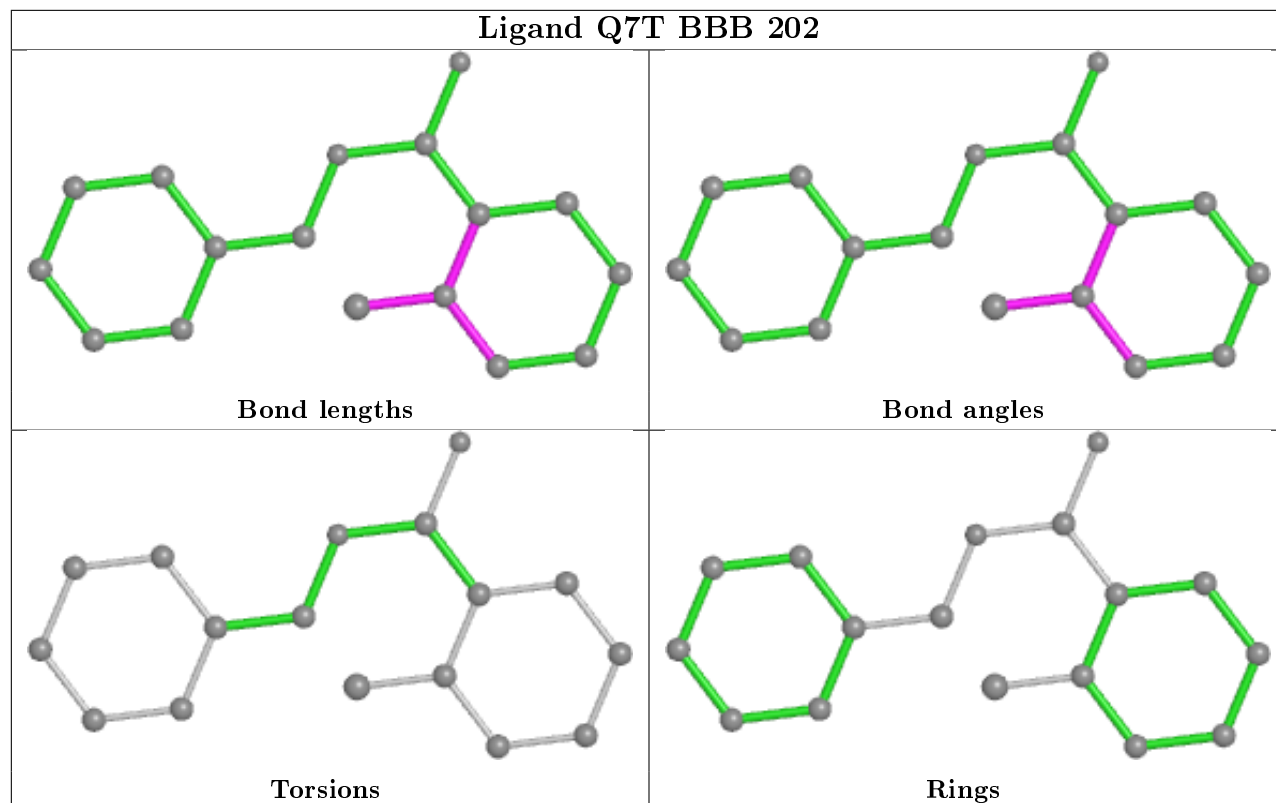
There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	BBB	202	Q7T	3	0
3	AAA	202	Q7T	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient

equivalents in the CSD to analyse the geometry.



5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

EDS failed to run properly - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

EDS failed to run properly - this section is therefore empty.

6.3 Carbohydrates ⓘ

EDS failed to run properly - this section is therefore empty.

6.4 Ligands ⓘ

EDS failed to run properly - this section is therefore empty.

6.5 Other polymers ⓘ

EDS failed to run properly - this section is therefore empty.