



# wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 9, 2026 – 04:29 PM UTC

PDB ID : 4MSG / pdb\_00004msg  
Title : Crystal structure of tankyrase 1 with compound 22  
Authors : Huang, X.  
Deposited on : 2013-09-18  
Resolution : 1.80 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto: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 types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	NOT EXECUTED
Xtriage (Phenix)	:	2.0
EDS	:	NOT EXECUTED
Buster-report	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

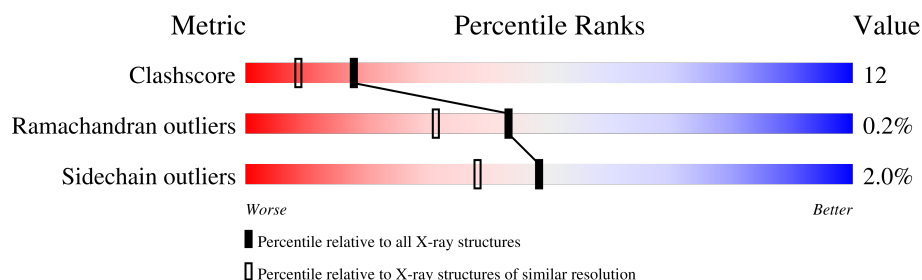
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.80 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	190562	8479 (1.80-1.80)
Ramachandran outliers	187476	8391 (1.80-1.80)
Sidechain outliers	187428	8390 (1.80-1.80)

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 of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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 was not executed.

Mol	Chain	Length	Quality of chain
1	A	217	 81% 14% . .
1	B	217	 66% 24% . . 7%

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 3842 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 Tankyrase-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	211	Total	C	N	O	S	0	0	0
			1687	1063	306	306	12			
1	B	202	Total	C	N	O	S	0	0	0
			1620	1019	297	294	10			

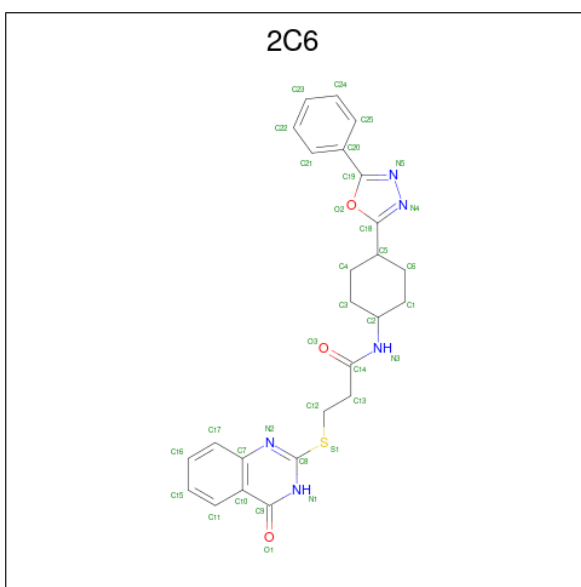
There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1315	HIS	-	expression tag	UNP O95271
A	1316	HIS	-	expression tag	UNP O95271
A	1317	HIS	-	expression tag	UNP O95271
A	1318	HIS	-	expression tag	UNP O95271
A	1319	HIS	-	expression tag	UNP O95271
A	1320	HIS	-	expression tag	UNP O95271
B	1315	HIS	-	expression tag	UNP O95271
B	1316	HIS	-	expression tag	UNP O95271
B	1317	HIS	-	expression tag	UNP O95271
B	1318	HIS	-	expression tag	UNP O95271
B	1319	HIS	-	expression tag	UNP O95271
B	1320	HIS	-	expression tag	UNP O95271

- Molecule 2 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Zn	0	0
			1	1		
2	B	1	Total	Zn	0	0
			1	1		

- Molecule 3 is 3-[(4-oxo-3,4-dihydroquinazolin-2-yl)sulfanyl]-N-[trans-4-(5-phenyl-1,3,4-oxadiazol-2-yl)cyclohexyl]propanamide (CCD ID: 2C6) (formula: C<sub>25</sub>H<sub>25</sub>N<sub>5</sub>O<sub>3</sub>S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total 34	C 25	N 5	O 3	S 1	0	0
3	B	1	Total 34	C 25	N 5	O 3	S 1	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	274	Total O 274 274	0	0
4	B	191	Total O 191 191	0	0



Note EDS was not executed.

- Chain A:

- Chain B:
- 
- 66% 24% 7%
- | Position | Residue | Category |
|----------|---------|----------|
| 1        | GLN     | Grey     |
| 2        | G1105   | Green    |
| 3        | E1114   | Yellow   |
| 4        | E1122   | Orange   |
| 5        | E1123   | Orange   |
| 6        | T1128   | Yellow   |
| 7        | R1133   | Yellow   |
| 8        | V1147   | Yellow   |
| 9        | K1152   | Yellow   |
| 10       | K1156   | Yellow   |
| 11       | K1157   | Yellow   |
| 12       | L1158   | Yellow   |
| 13       | R1159   | Green    |
| 14       | E1160   | Yellow   |
| 15       | R1161   | Orange   |
| 16       | F1162   | Green    |
| 17       | C1163   | Yellow   |
| 18       | E1171   | Yellow   |
| 19       | L1175   | Yellow   |
| 20       | E1179   | Yellow   |
| 21       | R1180   | Yellow   |
| 22       | I1189   | Yellow   |
| 23       | I1192   | Yellow   |
| 24       | K1195   | Yellow   |
| 25       | G1196   | Yellow   |
| 26       | H1201   | Yellow   |
| 27       | M1207   | Yellow   |
| 28       | F1208   | Yellow   |
| 29       | A1215   | Yellow   |
| 30       | E1216   | Yellow   |
| 31       | M1217   | Yellow   |
| 32       | I1228   | Yellow   |
| 33       | T1236   | Yellow   |
| 34       | H1237   | Green    |
| 35       | K1238   | Yellow   |
| 36       | Q1248   | Yellow   |
| 37       | F1251   | Yellow   |
| 38       | G1252   | Red      |
| 39       | R1253   | Red      |
| 40       | H1254   | Yellow   |
| 41       | K1258   | Green    |
| 42       | S1259   | Yellow   |
| 43       | F1260   | Yellow   |
| 44       | L1261   | Green    |
| 45       | Q1262   | Yellow   |
| 46       | F1263   | Yellow   |
| 47       | S1264   | Yellow   |
| 48       | T1265   | Red      |
| 49       | M1266   | Yellow   |
| 50       | K1267   | Yellow   |
| 51       | M1268   | Yellow   |
| 52       | P1272   | Yellow   |
| 53       | H1275   | Yellow   |
| 54       | V1278   | Yellow   |
| 55       | I1279   | Yellow   |
| 56       | G1280   | Yellow   |
| 57       | ARG     | Yellow   |
| 58       | PRO     | Yellow   |
| 59       | SER     | Yellow   |
| 60       | VAL     | Yellow   |
| 61       | ASN     | Grey     |
| 62       | GLY     | Grey     |
| 63       | LEU     | Grey     |
| 64       | ALA     | Grey     |
| 65       | Y1289   | Yellow   |
| 66       | A1290   | Orange   |
| 67       | E1291   | Yellow   |
| 68       | Y1292   | Yellow   |
| 69       | E1293   | Red      |
| 70       | Y1301   | Yellow   |
| 71       | I1306   | Yellow   |
| 72       | K1309   | Yellow   |
| 73       | I1310   | Yellow   |
| 74       | E1314   | Green    |
| 75       | HIS     | Grey     |
| 76       | HIS     | Grey     |
| 77       | HIS     | Grey     |
| 78       | HIS     | Grey     |
| 79       | HIS     | Grey     |
| 80       | HIS     | Grey     |

## 4 Data and refinement statistics

EDS was not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	41.53Å 77.57Å 148.15Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 1.80	Depositor
% Data completeness (in resolution range)	(Not available) (50.00-1.80)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.96 (at 1.79Å)	Xtriage
Refinement program	CNS	Depositor
R, $R_{free}$	0.212 , 0.234	Depositor
Wilson B-factor (Å <sup>2</sup> )	20.8	Xtriage
Anisotropy	0.524	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3842	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 12.61% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, 2C6

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	A	0.66	1/1730 (0.1%)	1.07	13/2327 (0.6%)
1	B	0.65	1/1660 (0.1%)	1.02	14/2230 (0.6%)
All	All	0.65	2/3390 (0.1%)	1.04	27/4557 (0.6%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	1290	ALA	C-O	-7.64	1.14	1.23
1	A	1120	SER	C-O	-5.95	1.17	1.24

The worst 5 of 27 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1314	GLU	CB-CG-CD	13.56	135.65	112.60
1	A	1168	GLU	CB-CG-CD	-9.06	97.20	112.60
1	B	1122	GLU	CB-CG-CD	6.78	124.12	112.60
1	A	1189	ILE	N-CA-C	6.72	118.29	110.62
1	A	1253	ARG	CG-CD-NE	-6.69	97.28	112.00

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

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	A	1687	0	1613	27	0
1	B	1620	0	1540	54	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	34	0	25	2	0
3	B	34	0	25	2	0
4	A	274	0	0	10	0
4	B	191	0	0	19	0
All	All	3842	0	3203	81	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 12.

The worst 5 of 81 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:B:1268:MET:HE1	1:B:1278:VAL:HG21	1.16	1.15
1:B:1290:ALA:O	4:B:1621:HOH:O	1.91	0.88
1:B:1268:MET:CE	1:B:1278:VAL:HG21	2.01	0.88
1:B:1267:LYS:HD2	4:B:1630:HOH:O	1.73	0.86
1:B:1289:TYR:N	4:B:1665:HOH:O	2.08	0.86

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	209/217 (96%)	207 (99%)	2 (1%)	0	100	100
1	B	198/217 (91%)	193 (98%)	4 (2%)	1 (0%)	24	14
All	All	407/434 (94%)	400 (98%)	6 (2%)	1 (0%)	43	31

All (1) Ramachandran outliers are listed below:



Mol	Chain	Res	Type
1	B	1265	THR

### 5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	176/185 (95%)	175 (99%)	1 (1%)	78	77
1	B	168/185 (91%)	162 (96%)	6 (4%)	31	18
All	All	344/370 (93%)	337 (98%)	7 (2%)	48	38

5 of 7 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	1252	CYS
1	B	1262	GLN
1	B	1298	GLU
1	B	1263	PHE
1	B	1161	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 15 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1270	HIS
1	B	1223	GLN
1	B	1174	HIS
1	B	1248	GLN
1	B	1190	ASN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

Mogul was not executed - this section is therefore empty.

## 5.5 Carbohydrates [i](#)

Mogul was not executed - this section is therefore empty.

## 5.6 Ligand geometry [i](#)

Mogul was not executed - this section is therefore empty.

## 5.7 Other polymers [i](#)

Mogul was not executed - this section is therefore empty.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

EDS was not executed - this section is therefore empty.

### 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

EDS was not executed - this section is therefore empty.

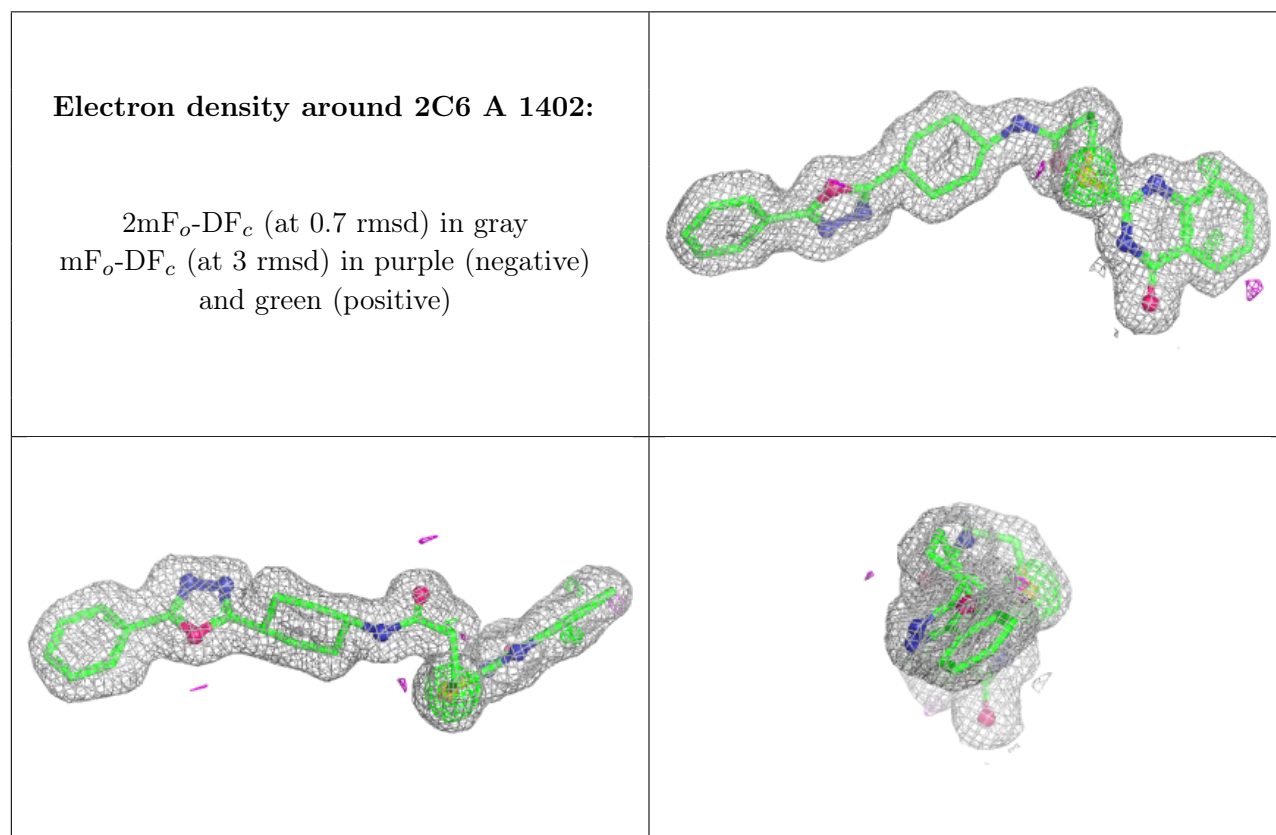
### 6.3 Carbohydrates [i](#)

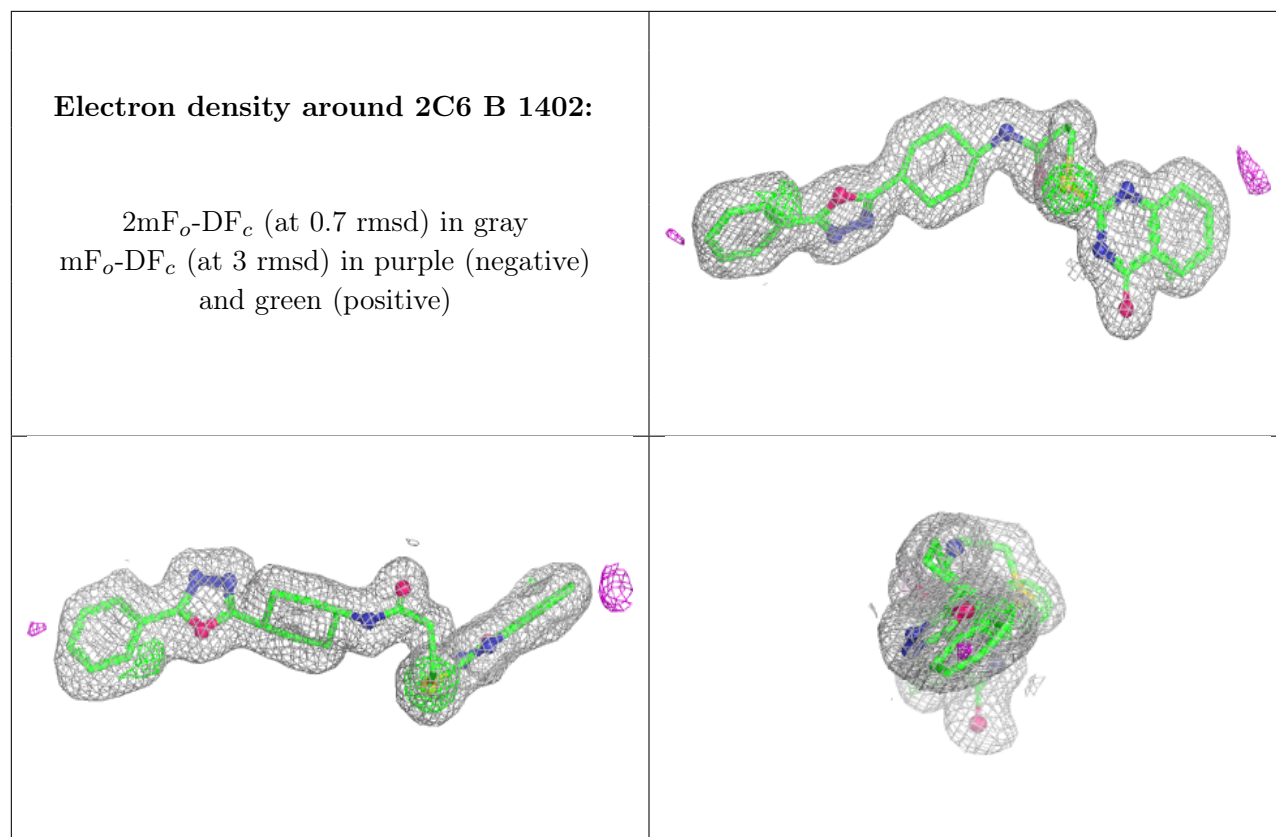
EDS was not executed - this section is therefore empty.

### 6.4 Ligands [i](#)

EDS was not executed - this section is therefore empty.

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.





## 6.5 Other polymers [i](#)

EDS was not executed - this section is therefore empty.