



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 12:29 PM UTC

PDB ID : 3MQ4 / pdb_00003mq4
Title : Metabotropic glutamate receptor mGluR7 complexed with LY341495 antagonist
Authors : Dobrovetsky, E.; Khutoreskaya, G.; Seitova, A.; He, H.; Weigelt, J.; Edwards, A.M.; Arrowsmith, C.H.; Bountra, C.; Cossar, D.; Bochkarev, A.; Structural Genomics Consortium (SGC)
Deposited on : 2010-04-27
Resolution : 2.80 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 types of validation reports are described at

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

The following versions of software and data (see [references](#) ①) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

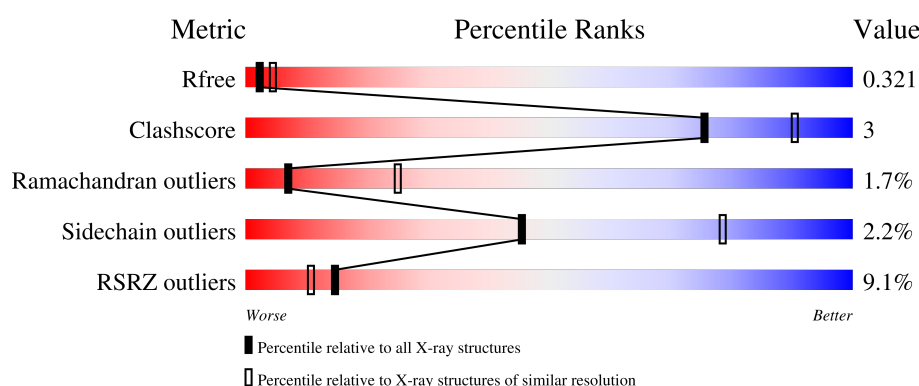
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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))
R_{free}	180053	3866 (2.80-2.80)
Clashscore	190562	4276 (2.80-2.80)
Ramachandran outliers	187476	4196 (2.80-2.80)
Sidechain outliers	187428	4198 (2.80-2.80)
RSRZ outliers	180081	3869 (2.80-2.80)

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 ≥ 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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	481	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 2705 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 Metabotropic glutamate receptor 7.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	386	Total	C	N	O	S	0	0	0
			2678	1699	460	507	12			

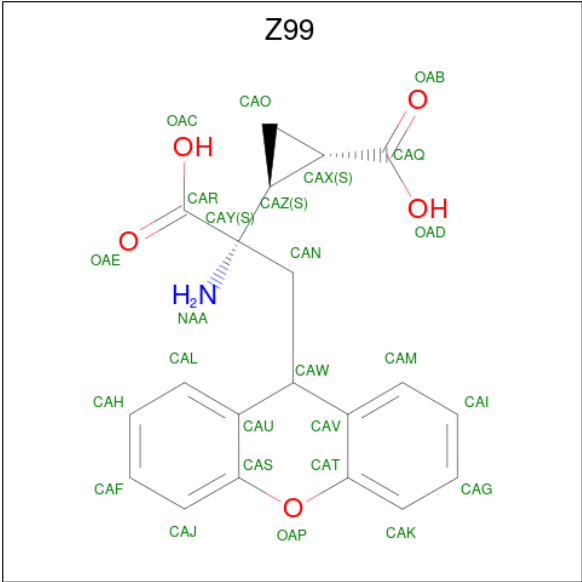
There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	33	GLY	-	expression tag	UNP Q14831
A	34	ALA	-	expression tag	UNP Q14831
A	35	MET	-	expression tag	UNP Q14831
A	36	ASP	-	expression tag	UNP Q14831
A	249	SER	CYS	engineered mutation	UNP Q14831

- Molecule 2 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Mg	0	0
			1	1		

- Molecule 3 is 2-[(1S,2S)-2-carboxycyclopropyl]-3-(9H-xanthen-9-yl)-D-alanine (CCD ID: Z99) (formula: C₂₀H₁₉NO₅).

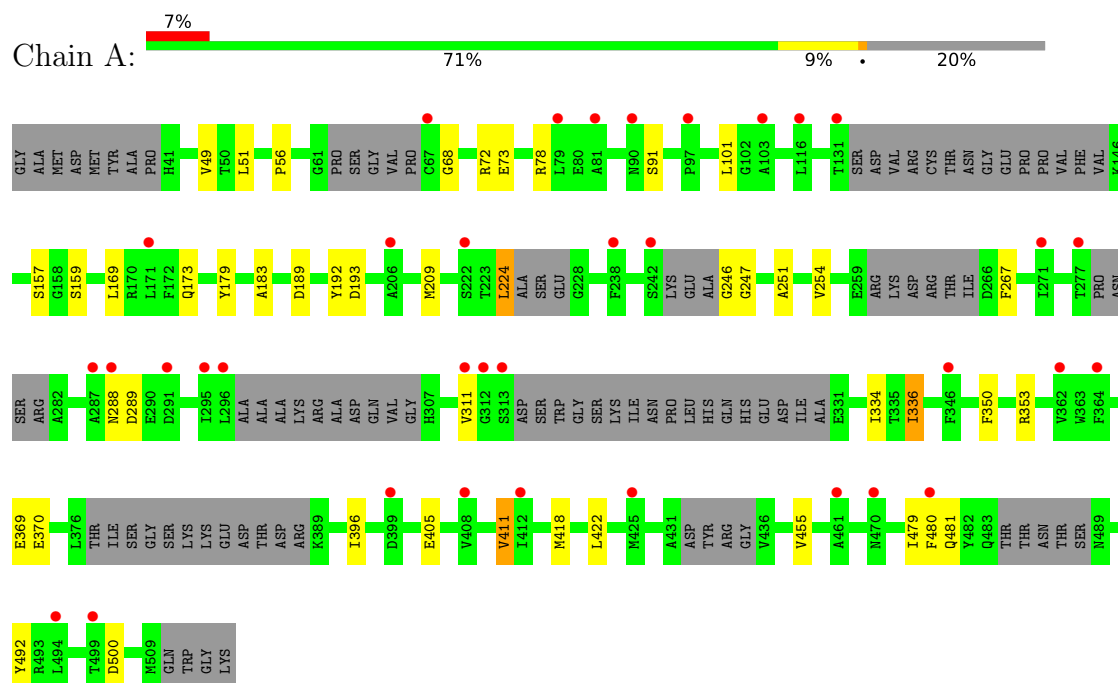


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			26	20	1	5		

3 Residue-property plots [i](#)

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 and electron density. 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. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). 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.

- Molecule 1: Metabotropic glutamate receptor 7



4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	54.67Å 131.16Å 140.64Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	27.60 – 2.80 27.60 – 2.80	Depositor EDS
% Data completeness (in resolution range)	(Not available) (27.60-2.80) 99.3 (27.60-2.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.69 (at 2.80Å)	Xtriage
Refinement program	BUSTER 2.8.0	Depositor
R, R_{free}	0.262 , 0.293 0.269 , 0.321	Depositor DCC
R_{free} test set	626 reflections (4.90%)	wwPDB-VP
Wilson B-factor (Å ²)	91.7	Xtriage
Anisotropy	0.433	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 121.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	2705	wwPDB-VP
Average B, all atoms (Å ²)	114.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.03% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MG, Z99

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	0.81	0/2722	1.39	13/3709 (0.4%)

There are no bond length outliers.

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	91	SER	N-CA-C	-7.12	105.12	114.31
1	A	183	ALA	N-CA-C	6.48	117.05	109.60
1	A	68	GLY	N-CA-C	5.77	117.77	110.38
1	A	169	LEU	CA-C-N	5.42	127.86	120.54
1	A	169	LEU	C-N-CA	5.42	127.86	120.54
1	A	72	ARG	N-CA-C	5.30	117.48	111.02
1	A	411	VAL	CA-C-N	5.15	127.05	120.56
1	A	411	VAL	C-N-CA	5.15	127.05	120.56
1	A	455	VAL	N-CA-CB	5.15	118.16	110.13
1	A	396	ILE	N-CA-C	5.11	115.72	110.36
1	A	192	TYR	CA-C-N	5.10	131.29	121.54
1	A	192	TYR	C-N-CA	5.10	131.29	121.54
1	A	159	SER	N-CA-C	5.08	117.47	111.33

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	2678	0	2282	15	0
2	A	1	0	0	0	0
3	A	26	0	16	0	0
All	All	2705	0	2298	15	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 3.

All (15) 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:A:209:MET:HE2	1:A:311:VAL:HG12	1.78	0.65
1:A:51:LEU:CD2	1:A:418:MET:HG2	2.40	0.52
1:A:224:LEU:HD23	1:A:254:VAL:HG23	1.92	0.52
1:A:73:GLU:HB3	1:A:405:GLU:HB2	1.93	0.51
1:A:480:PHE:HB3	1:A:492:TYR:HB3	1.95	0.48
1:A:51:LEU:HD21	1:A:418:MET:HG2	1.96	0.47
1:A:101:LEU:HD11	1:A:422:LEU:HD13	1.97	0.45
1:A:78:ARG:O	1:A:411:VAL:HG11	2.16	0.45
1:A:246:GLY:HA2	1:A:247:GLY:HA2	1.76	0.44
1:A:56:PRO:HD3	1:A:157:SER:HB3	1.99	0.44
1:A:334:ILE:HG13	1:A:481:GLN:HG3	2.01	0.43
1:A:336:ILE:HD12	1:A:479:ILE:HG12	2.01	0.43
1:A:157:SER:HB2	1:A:179:TYR:CE1	2.55	0.42
1:A:350:PHE:HA	1:A:353:ARG:HG2	2.02	0.41
1:A:288:ASN:HA	1:A:289:ASP:HA	1.93	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	362/481 (75%)	326 (90%)	30 (8%)	6 (2%)	7 25

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	500	ASP
1	A	189	ASP
1	A	370	GLU
1	A	251	ALA
1	A	193	ASP
1	A	267	PHE

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	224/406 (55%)	219 (98%)	5 (2%)	45 78

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	49	VAL
1	A	173	GLN
1	A	224	LEU
1	A	336	ILE
1	A	369	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	74	ASN
1	A	118	GLN
1	A	337	GLN
1	A	371	ASN
1	A	426	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 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	$\# Z > 2$
3	Z99	A	514	-	26,29,29	3.70	15 (57%)	34,44,44	2.42	15 (44%)

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	Z99	A	514	-	-	3/16/38/38	0/4/4/4

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	514	Z99	CAT-CAV	8.87	1.56	1.39
3	A	514	Z99	CAS-CAU	7.73	1.54	1.39
3	A	514	Z99	CAM-CAV	6.31	1.47	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	514	Z99	CAG-CAK	5.54	1.48	1.38
3	A	514	Z99	CAU-CAW	4.83	1.59	1.52
3	A	514	Z99	CAI-CAG	4.23	1.47	1.38
3	A	514	Z99	CAL-CAU	4.05	1.44	1.39
3	A	514	Z99	OAB-CAQ	3.95	1.33	1.22
3	A	514	Z99	OAP-CAS	3.83	1.45	1.38
3	A	514	Z99	CAI-CAM	3.62	1.45	1.38
3	A	514	Z99	CAH-CAF	3.29	1.45	1.38
3	A	514	Z99	CAF-CAJ	3.23	1.44	1.38
3	A	514	Z99	CAV-CAW	2.54	1.55	1.52
3	A	514	Z99	OAP-CAT	2.15	1.42	1.38
3	A	514	Z99	CAK-CAT	2.09	1.43	1.39

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	514	Z99	CAY-CAN-CAW	7.30	128.53	117.10
3	A	514	Z99	OAC-CAR-CAY	4.71	125.80	113.53
3	A	514	Z99	OAD-CAQ-OAB	3.92	132.98	124.08
3	A	514	Z99	OAE-CAR-CAY	-3.66	113.11	122.53
3	A	514	Z99	CAT-OAP-CAS	-3.55	109.34	118.45
3	A	514	Z99	CAL-CAU-CAS	3.30	121.36	117.74
3	A	514	Z99	CAM-CAV-CAT	3.22	121.28	117.74
3	A	514	Z99	CAH-CAL-CAU	-2.71	117.75	120.99
3	A	514	Z99	OAB-CAQ-CAX	-2.32	117.54	123.01
3	A	514	Z99	CAK-CAT-CAV	-2.32	117.90	121.14
3	A	514	Z99	CAI-CAM-CAV	-2.23	118.32	120.99
3	A	514	Z99	CAO-CAX-CAZ	2.10	60.56	59.26
3	A	514	Z99	CAH-CAF-CAJ	2.05	122.77	120.24
3	A	514	Z99	CAJ-CAS-CAU	-2.04	118.29	121.14
3	A	514	Z99	CAO-CAX-CAQ	2.01	122.05	118.94

There are no chirality outliers.

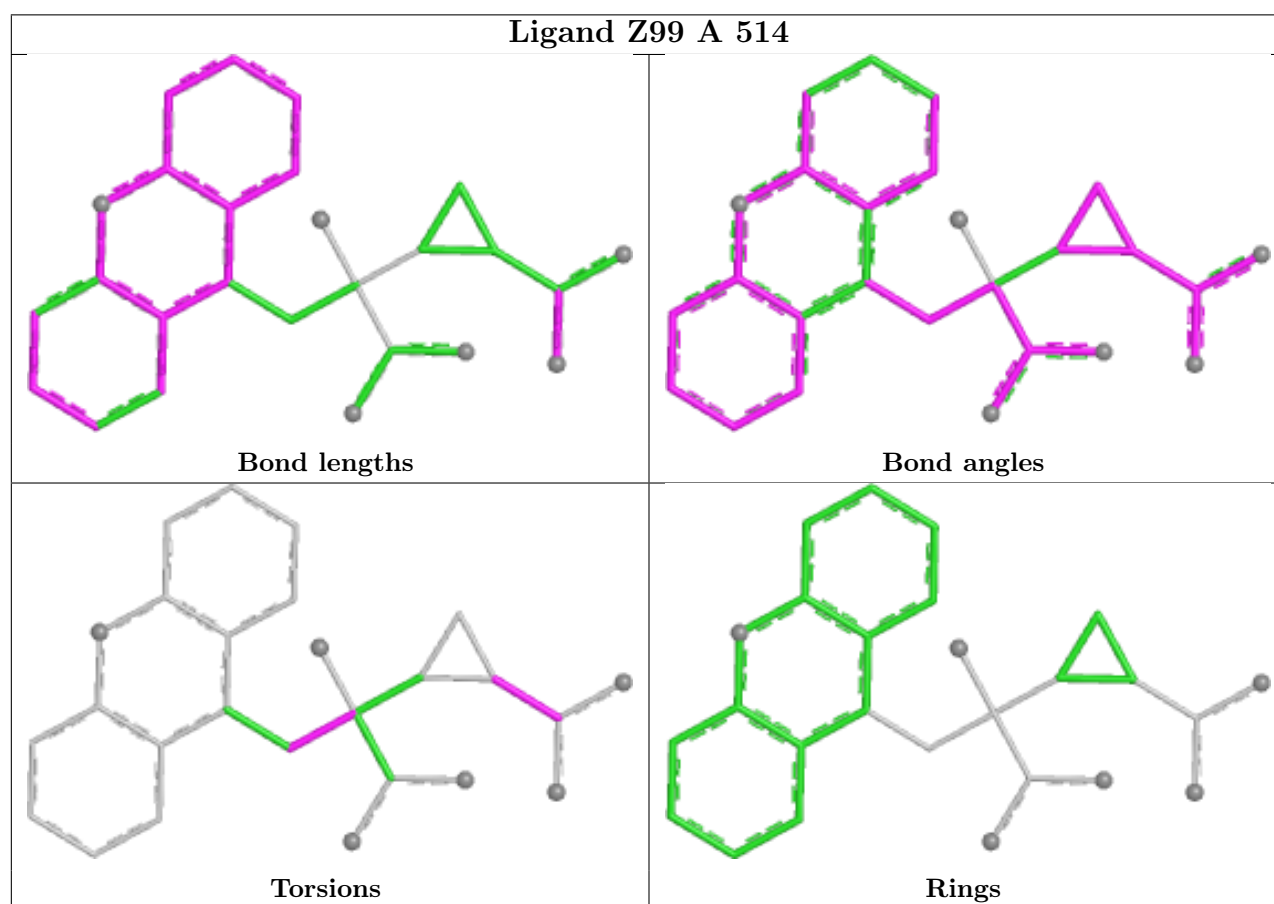
All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	514	Z99	OAD-CAQ-CAX-CAZ
3	A	514	Z99	OAB-CAQ-CAX-CAZ
3	A	514	Z99	CAW-CAN-CAY-NAA

There are no ring outliers.

No monomer is involved in short contacts.

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 [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	386/481 (80%)	0.69	35 (9%) 15 11	62, 106, 191, 245	0

All (35) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	311	VAL	5.9
1	A	222	SER	3.5
1	A	288	ASN	3.5
1	A	79	LEU	3.4
1	A	103	ALA	3.4
1	A	291	ASP	3.4
1	A	67	CYS	3.3
1	A	242	SER	3.3
1	A	277	THR	3.2
1	A	399	ASP	3.2
1	A	90	ASN	2.8
1	A	312	GLY	2.7
1	A	494	LEU	2.7
1	A	295	ILE	2.7
1	A	412	ILE	2.7
1	A	238	PHE	2.6
1	A	408	VAL	2.6
1	A	296	LEU	2.5
1	A	346	PHE	2.4
1	A	470	ASN	2.4
1	A	206	ALA	2.4
1	A	116	LEU	2.3
1	A	480	PHE	2.3
1	A	81	ALA	2.3
1	A	313	SER	2.2
1	A	362	VAL	2.2
1	A	461	ALA	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	171	LEU	2.1
1	A	425	MET	2.1
1	A	97	PRO	2.1
1	A	364	PHE	2.1
1	A	271	ILE	2.0
1	A	131	THR	2.0
1	A	287	ALA	2.0
1	A	499	THR	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

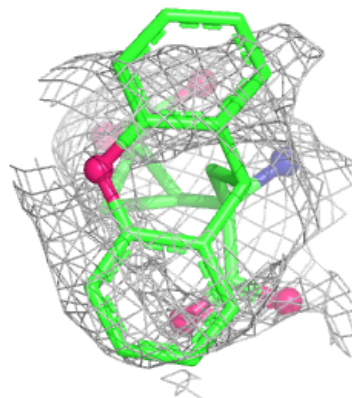
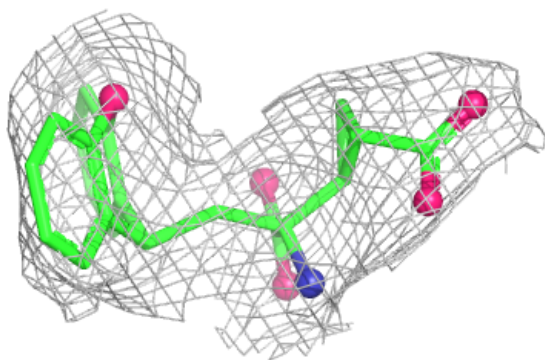
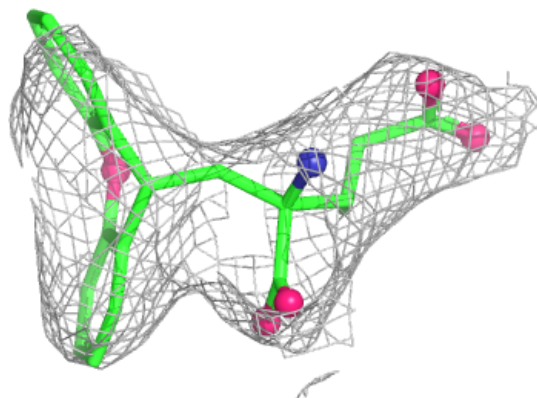
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	MG	A	1	1/1	0.67	0.15	101,101,101,101	0
3	Z99	A	514	26/26	0.87	0.09	97,108,117,119	0

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.

Electron density around Z99 A 514:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



6.5 Other polymers ⓘ

There are no such residues in this entry.