



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 12:53 PM UTC

PDB ID : 7QR9 / pdb_00007qr9
Title : Crystal structure of CK1 delta in complex with PK-09-82
Authors : Chaikuad, A.; Khirsariya, P.; Paruch, K.; Knapp, S.; Structural Genomics Consortium (SGC)
Deposited on : 2022-01-10
Resolution : 2.30 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 ⓘ](#)) 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

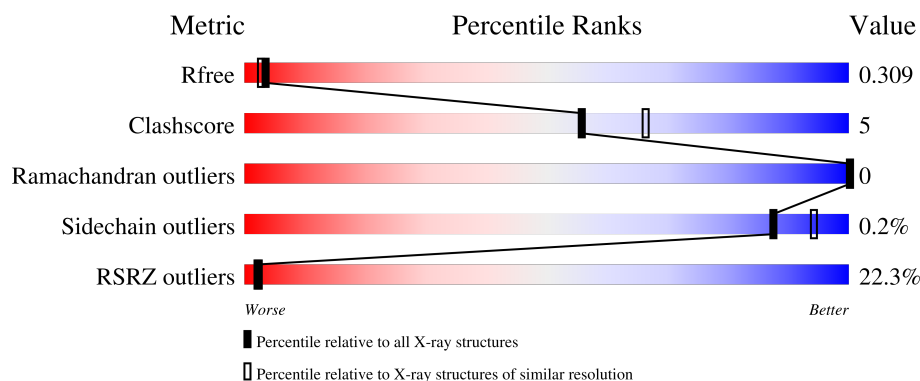
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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	296	18% 87% 11% .
1	B	296	22% 90% 8% .
1	C	296	24% 83% 12% .
1	D	296	23% 80% 16% .

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	EDO	A	310	-	-	X	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 9847 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 Casein kinase I isoform delta.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	289	Total	C	N	O	S	0	0	0
			2351	1507	412	418	14			
1	B	291	Total	C	N	O	S	0	1	0
			2365	1514	416	421	14			
1	C	283	Total	C	N	O	S	0	1	0
			2295	1476	399	406	14			
1	D	283	Total	C	N	O	S	0	1	0
			2295	1476	399	406	14			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	SER	-	expression tag	UNP P48730
A	0	MET	-	expression tag	UNP P48730
B	-1	SER	-	expression tag	UNP P48730
B	0	MET	-	expression tag	UNP P48730
C	-1	SER	-	expression tag	UNP P48730
C	0	MET	-	expression tag	UNP P48730
D	-1	SER	-	expression tag	UNP P48730
D	0	MET	-	expression tag	UNP P48730

- Molecule 2 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



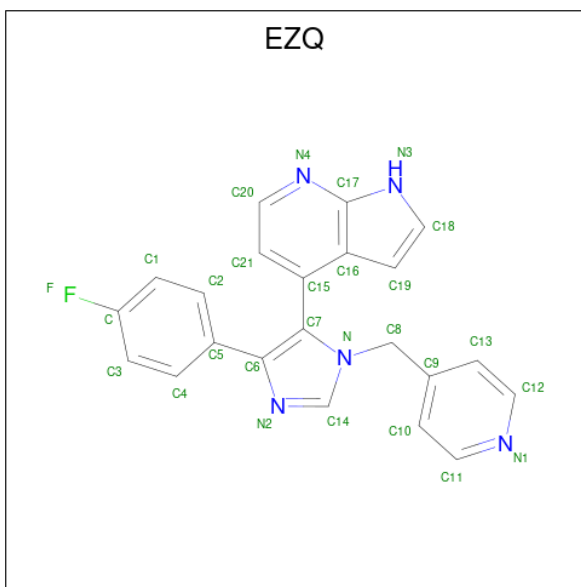
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	C	1	Total	O	S	0	0
			5	4	1		
2	C	1	Total	O	S	0	0
			5	4	1		
2	D	1	Total	O	S	0	0
			5	4	1		
2	D	1	Total	O	S	0	0
			5	4	1		

- Molecule 3 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		

- Molecule 4 is 4-[5-(4-fluorophenyl)-3-(pyridin-4-ylmethyl)imidazol-4-yl]-1 {H}-pyrrolo[2,3-b]pyridine (CCD ID: EZQ) (formula: C₂₂H₁₆FN₅) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	F	N	0	0
			28	22	1	5		
4	B	1	Total	C	F	N	0	0
			28	22	1	5		
4	C	1	Total	C	F	N	0	0
			28	22	1	5		
4	D	1	Total	C	F	N	0	0
			28	22	1	5		

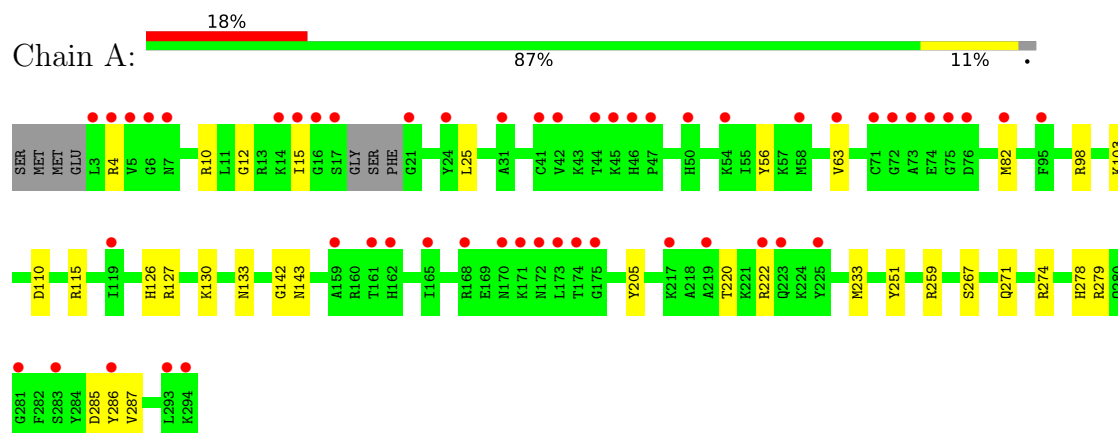
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	98	Total	O	0	0
			98	98		
5	B	102	Total	O	0	0
			102	102		
5	C	75	Total	O	0	0
			75	75		
5	D	74	Total	O	0	0
			74	74		

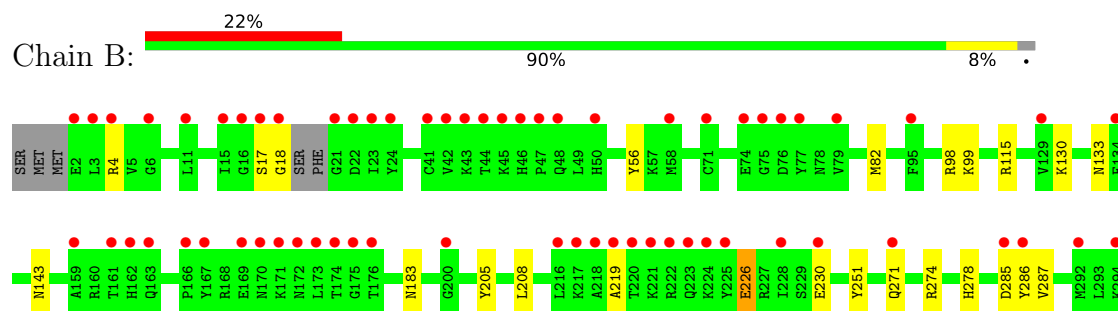
3 Residue-property plots

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 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.

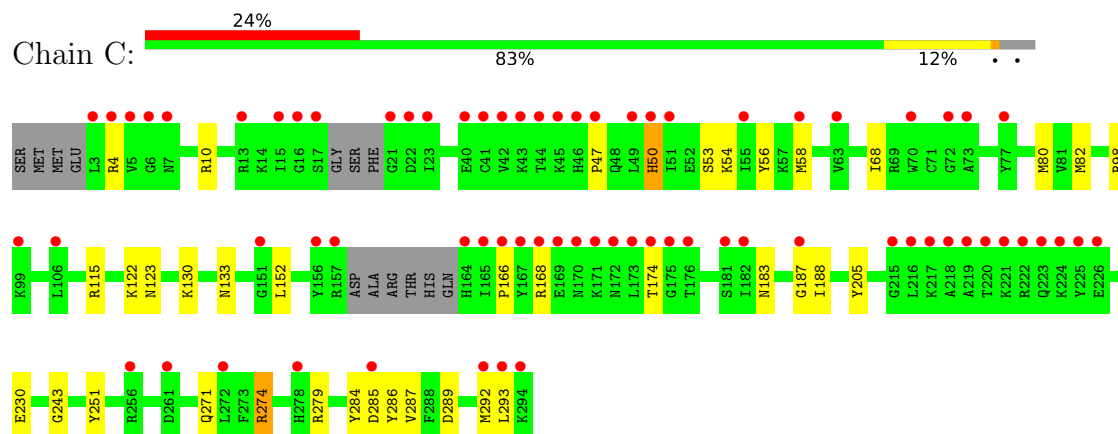
• Molecule 1: Casein kinase I isoform delta



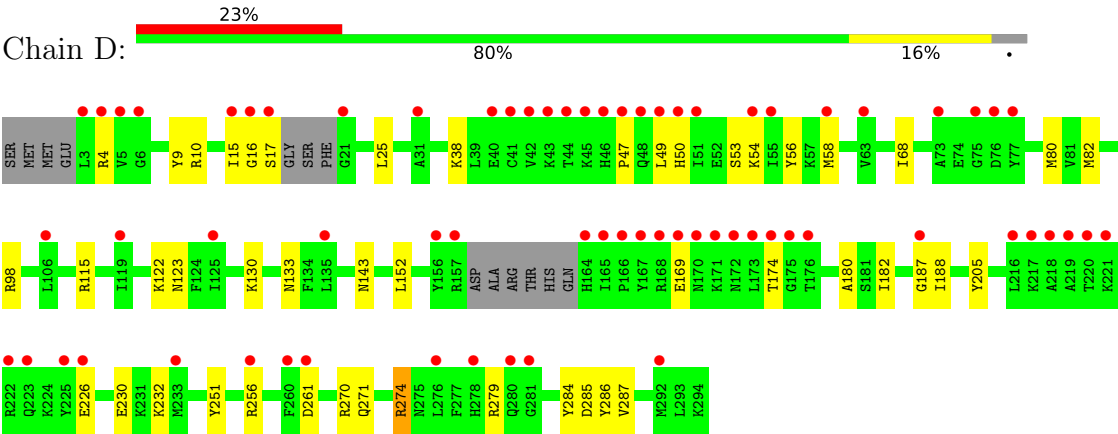
• Molecule 1: Casein kinase I isoform delta



• Molecule 1: Casein kinase I isoform delta



● Molecule 1: Casein kinase I isoform delta



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	49.44Å 85.24Å 89.68Å 70.27° 74.10° 86.86°	Depositor
Resolution (Å)	70.03 – 2.30 70.03 – 2.30	Depositor EDS
% Data completeness (in resolution range)	93.5 (70.03-2.30) 93.5 (70.03-2.30)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.73 (at 2.29Å)	Xtriage
Refinement program	REFMAC 5.8.0230	Depositor
R, R_{free}	0.252 , 0.305 0.259 , 0.309	Depositor DCC
R_{free} test set	2609 reflections (4.43%)	wwPDB-VP
Wilson B-factor (Å ²)	28.5	Xtriage
Anisotropy	0.331	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 34.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.52$, $\langle L^2 \rangle = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.89	EDS
Total number of atoms	9847	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.66% 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: EDO, EZQ, 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	A	0.92	3/2403 (0.1%)	0.96	0/3229
1	B	0.92	0/2420	0.95	1/3252 (0.0%)
1	C	0.93	1/2348 (0.0%)	0.97	1/3155 (0.0%)
1	D	0.93	1/2348 (0.0%)	1.00	3/3155 (0.1%)
All	All	0.93	5/9519 (0.1%)	0.97	5/12791 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	4
1	B	0	2
1	C	0	5
1	D	0	6
All	All	0	17

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	126	HIS	CE1-NE2	6.64	1.39	1.32
1	C	188	ILE	C-O	-5.67	1.16	1.24
1	A	233	MET	C-O	-5.47	1.17	1.24
1	D	188	ILE	C-O	-5.42	1.16	1.24
1	A	12	GLY	N-CA	5.09	1.50	1.45

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	187	GLY	O-C-N	6.66	130.30	122.38
1	C	187	GLY	O-C-N	6.13	129.67	122.38
1	B	226	GLU	CB-CG-CD	5.45	121.86	112.60
1	D	188	ILE	CA-C-N	5.01	127.88	120.82
1	D	188	ILE	C-N-CA	5.01	127.88	120.82

There are no chirality outliers.

All (17) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	10	ARG	Sidechain
1	A	115	ARG	Sidechain
1	A	279	ARG	Sidechain
1	A	4	ARG	Sidechain
1	B	115	ARG	Sidechain
1	B	4	ARG	Sidechain
1	C	10	ARG	Sidechain
1	C	115	ARG	Sidechain
1	C	274	ARG	Sidechain
1	C	279	ARG	Sidechain
1	C	4	ARG	Sidechain
1	D	10	ARG	Sidechain
1	D	115	ARG	Sidechain
1	D	270	ARG	Sidechain
1	D	274	ARG	Sidechain
1	D	279	ARG	Sidechain
1	D	4	ARG	Sidechain

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	2351	0	2342	26	0
1	B	2365	0	2352	17	0
1	C	2295	0	2280	22	0
1	D	2295	0	2280	30	0
2	A	10	0	0	0	0
2	B	10	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	10	0	0	0	0
2	D	10	0	0	0	0
3	A	36	0	54	7	0
3	B	4	0	6	0	0
4	A	28	0	0	0	0
4	B	28	0	0	0	0
4	C	28	0	0	0	0
4	D	28	0	0	0	0
5	A	98	0	0	5	0
5	B	102	0	0	4	0
5	C	75	0	0	2	0
5	D	74	0	0	3	0
All	All	9847	0	9314	89	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 5.

All (89) 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:222:ARG:HB3	1:B:226:GLU:HG3	1.58	0.83
1:A:285:ASP:O	1:A:285:ASP:OD1	2.03	0.77
1:B:285:ASP:OD1	1:B:285:ASP:O	2.04	0.76
1:D:47:PRO:HB2	1:D:50:HIS:CE1	2.23	0.74
1:D:285:ASP:O	1:D:285:ASP:OD1	2.06	0.74
1:C:285:ASP:O	1:C:285:ASP:OD1	2.06	0.73
1:C:68:ILE:HG12	1:C:80:MET:HE2	1.72	0.72
1:D:68:ILE:HG12	1:D:80:MET:HE2	1.73	0.71
1:A:274:ARG:HH22	3:A:310:EDO:H12	1.59	0.67
1:A:271:GLN:OE1	1:A:274:ARG:NH1	2.28	0.66
1:B:271:GLN:OE1	1:B:274:ARG:NH1	2.29	0.66
1:D:271:GLN:OE1	1:D:274:ARG:NH1	2.30	0.65
1:C:271:GLN:OE1	1:C:274:ARG:NH1	2.30	0.64
1:D:169:GLU:OE1	5:D:402:HOH:O	2.15	0.63
1:A:222:ARG:HH21	1:B:230:GLU:HG2	1.66	0.61
1:A:127:ARG:O	5:A:401:HOH:O	2.16	0.61
1:A:267:SER:HA	3:A:310:EDO:H11	1.82	0.60
1:C:54:LYS:HG2	1:C:58:MET:HE2	1.83	0.60
1:A:142:GLY:HA3	5:A:449:HOH:O	2.01	0.60
1:A:63:VAL:HB	3:A:303:EDO:H21	1.84	0.59
1:C:284:TYR:HE1	1:C:286:TYR:CE2	2.21	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:284:TYR:HE1	1:D:286:TYR:CE2	2.22	0.58
1:C:152:LEU:HD22	1:C:174:THR:OG1	2.04	0.57
1:A:274:ARG:HH22	3:A:310:EDO:C1	2.18	0.56
1:C:243:GLY:C	5:C:409:HOH:O	2.49	0.56
1:B:219:ALA:HA	1:C:230:GLU:OE1	2.06	0.56
1:A:143:ASN:HB2	1:A:286:TYR:CB	2.36	0.55
1:B:143:ASN:HB2	1:B:286:TYR:CB	2.37	0.54
1:A:222:ARG:HB3	1:B:226:GLU:CG	2.34	0.54
1:D:152:LEU:HD22	1:D:174:THR:OG1	2.08	0.54
1:A:103:LYS:HD3	5:A:462:HOH:O	2.08	0.53
1:B:285:ASP:O	1:B:287:VAL:N	2.36	0.53
1:A:285:ASP:O	1:A:287:VAL:N	2.37	0.52
1:D:226:GLU:O	1:D:230:GLU:HG3	2.10	0.52
1:D:54:LYS:HE2	1:D:58:MET:HE2	1.92	0.51
1:D:56:TYR:OH	5:D:403:HOH:O	2.19	0.51
1:B:17:SER:O	1:B:18:GLY:C	2.55	0.50
1:D:285:ASP:O	1:D:287:VAL:N	2.36	0.50
1:C:47:PRO:HB3	1:C:50:HIS:CE1	2.47	0.50
1:D:54:LYS:HG2	1:D:58:MET:HE2	1.93	0.50
1:B:98:ARG:NH2	1:B:205:TYR:OH	2.44	0.49
1:C:56:TYR:CD1	1:C:82:MET:HE1	2.48	0.48
1:D:56:TYR:CD1	1:D:82:MET:HE1	2.49	0.48
1:C:285:ASP:O	1:C:287:VAL:N	2.37	0.48
1:A:98:ARG:NH2	1:A:205:TYR:OH	2.45	0.48
1:A:110:ASP:HB3	3:A:306:EDO:H12	1.97	0.46
1:B:278:HIS:NE2	5:B:402:HOH:O	2.33	0.46
1:D:53:SER:HB2	1:D:80:MET:HE3	1.97	0.46
1:C:98:ARG:NH2	1:C:205:TYR:OH	2.48	0.46
1:D:182:ILE:HD12	1:D:256[A]:ARG:NE	2.31	0.46
1:A:286:TYR:HE1	3:A:306:EDO:H21	1.81	0.45
1:C:183:ASN:ND2	5:C:410:HOH:O	2.48	0.45
1:C:53:SER:HB2	1:C:80:MET:HE3	1.99	0.44
1:D:9:TYR:OH	5:D:401:HOH:O	2.12	0.44
1:D:54:LYS:HG2	1:D:58:MET:CE	2.48	0.44
1:C:289:ASP:HA	1:C:292:MET:HE3	1.99	0.44
1:D:16:GLY:O	1:D:17:SER:C	2.61	0.44
1:D:38:LYS:HD3	1:D:49:LEU:HD13	2.01	0.43
1:A:220:THR:HB	1:D:230:GLU:OE2	2.19	0.43
1:A:56:TYR:CD1	1:A:82:MET:HE1	2.54	0.43
1:B:99:LYS:HA	5:B:451:HOH:O	2.18	0.43
1:C:50:HIS:ND1	1:C:50:HIS:N	2.62	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:166:PRO:HD2	1:C:168:ARG:CZ	2.49	0.43
1:A:15:ILE:HD11	1:A:25:LEU:HB2	2.01	0.43
1:B:183:ASN:ND2	5:B:403:HOH:O	2.35	0.43
1:C:130:LYS:HE2	1:C:133:ASN:ND2	2.34	0.43
1:B:56:TYR:CD1	1:B:82:MET:HE1	2.54	0.42
1:D:130:LYS:HE2	1:D:133:ASN:ND2	2.34	0.42
1:A:130:LYS:HE2	1:A:133:ASN:ND2	2.35	0.42
1:D:98:ARG:NH2	1:D:205:TYR:OH	2.51	0.42
1:B:208:LEU:C	5:B:427:HOH:O	2.62	0.42
1:C:251:TYR:C	1:C:251:TYR:CD1	2.97	0.42
1:A:278:HIS:NE2	5:A:405:HOH:O	2.32	0.42
1:D:68:ILE:HG12	1:D:80:MET:CE	2.46	0.41
1:A:274:ARG:NH2	3:A:310:EDO:H12	2.33	0.41
1:A:259:ARG:CD	5:A:495:HOH:O	2.68	0.41
1:D:122:LYS:O	1:D:123:ASN:HB2	2.21	0.41
1:C:68:ILE:HG12	1:C:80:MET:CE	2.46	0.41
1:B:130:LYS:HE2	1:B:133:ASN:ND2	2.36	0.41
1:C:54:LYS:O	1:C:58:MET:HG3	2.21	0.41
1:B:251:TYR:CD1	1:B:251:TYR:C	2.98	0.41
1:A:251:TYR:CD1	1:A:251:TYR:C	2.99	0.41
1:D:15:ILE:HD11	1:D:25:LEU:HB2	2.03	0.41
1:D:251:TYR:CD1	1:D:251:TYR:C	2.99	0.41
1:A:220:THR:HA	1:D:226:GLU:OE1	2.22	0.40
1:C:122:LYS:O	1:C:123:ASN:HB2	2.22	0.40
1:D:180:ALA:O	1:D:232:LYS:NZ	2.51	0.40
1:D:143:ASN:HB2	1:D:286:TYR:CB	2.51	0.40
1:D:261:ASP:OD1	1:D:261:ASP:C	2.64	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	285/296 (96%)	275 (96%)	10 (4%)	0	100	100
1	B	288/296 (97%)	276 (96%)	12 (4%)	0	100	100
1	C	278/296 (94%)	267 (96%)	11 (4%)	0	100	100
1	D	278/296 (94%)	270 (97%)	8 (3%)	0	100	100
All	All	1129/1184 (95%)	1088 (96%)	41 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	249/260 (96%)	249 (100%)	0	100	100
1	B	250/260 (96%)	250 (100%)	0	100	100
1	C	241/260 (93%)	239 (99%)	2 (1%)	73	86
1	D	241/260 (93%)	241 (100%)	0	100	100
All	All	981/1040 (94%)	979 (100%)	2 (0%)	87	94

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	50	HIS
1	C	293	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	170	ASN
1	A	223	GLN
1	B	50	HIS
1	B	78	ASN
1	B	190	GLN

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Mol	Chain	Res	Type
1	B	223	GLN
1	D	50	HIS
1	D	223	GLN

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](#)

22 ligands are modelled in this entry.

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	$\# Z > 2$
2	SO4	C	302	-	4,4,4	0.46	0	6,6,6	0.18	0
4	EZQ	D	303	-	32,32,32	0.29	0	41,45,45	0.66	1 (2%)
3	EDO	A	306	-	3,3,3	0.48	0	2,2,2	0.29	0
3	EDO	A	305	-	3,3,3	0.49	0	2,2,2	0.43	0
2	SO4	A	301	-	4,4,4	0.48	0	6,6,6	0.16	0
3	EDO	B	303	-	3,3,3	0.44	0	2,2,2	0.32	0
2	SO4	D	302	-	4,4,4	0.40	0	6,6,6	0.21	0
3	EDO	A	310	-	3,3,3	0.47	0	2,2,2	0.54	0
4	EZQ	C	303	-	32,32,32	0.34	0	41,45,45	0.68	1 (2%)
3	EDO	A	304	-	3,3,3	0.40	0	2,2,2	0.42	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	SO4	B	302	-	4,4,4	0.46	0	6,6,6	0.10	0
2	SO4	A	302	-	4,4,4	0.42	0	6,6,6	0.13	0
4	EZQ	A	312	-	32,32,32	0.26	0	41,45,45	0.60	1 (2%)
3	EDO	A	311	-	3,3,3	0.53	0	2,2,2	0.29	0
2	SO4	B	301	-	4,4,4	0.39	0	6,6,6	0.20	0
4	EZQ	B	304	-	32,32,32	0.27	0	41,45,45	0.66	2 (4%)
3	EDO	A	307	-	3,3,3	0.36	0	2,2,2	0.47	0
3	EDO	A	303	-	3,3,3	0.60	0	2,2,2	0.20	0
3	EDO	A	309	-	3,3,3	0.34	0	2,2,2	0.50	0
2	SO4	D	301	-	4,4,4	0.38	0	6,6,6	0.41	0
2	SO4	C	301	-	4,4,4	0.34	0	6,6,6	0.35	0
3	EDO	A	308	-	3,3,3	0.44	0	2,2,2	0.40	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	EDO	A	303	-	-	0/1/1/1	-
3	EDO	A	309	-	-	0/1/1/1	-
4	EZQ	A	312	-	-	3/12/12/12	0/5/5/5
3	EDO	A	306	-	-	0/1/1/1	-
3	EDO	A	305	-	-	0/1/1/1	-
4	EZQ	D	303	-	-	1/12/12/12	0/5/5/5
3	EDO	B	303	-	-	1/1/1/1	-
3	EDO	A	311	-	-	0/1/1/1	-
3	EDO	A	310	-	-	1/1/1/1	-
4	EZQ	B	304	-	-	4/12/12/12	0/5/5/5
4	EZQ	C	303	-	-	2/12/12/12	0/5/5/5
3	EDO	A	304	-	-	1/1/1/1	-
3	EDO	A	307	-	-	0/1/1/1	-
3	EDO	A	308	-	-	1/1/1/1	-

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	303	EZQ	C16-C17-N4	-2.93	124.11	126.40
4	B	304	EZQ	C16-C17-N4	-2.90	124.14	126.40
4	D	303	EZQ	C16-C17-N4	-2.70	124.29	126.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	312	EZQ	C16-C17-N4	-2.58	124.38	126.40
4	B	304	EZQ	C14-N2-C6	-2.14	104.19	105.51

There are no chirality outliers.

All (14) torsion outliers are listed below:

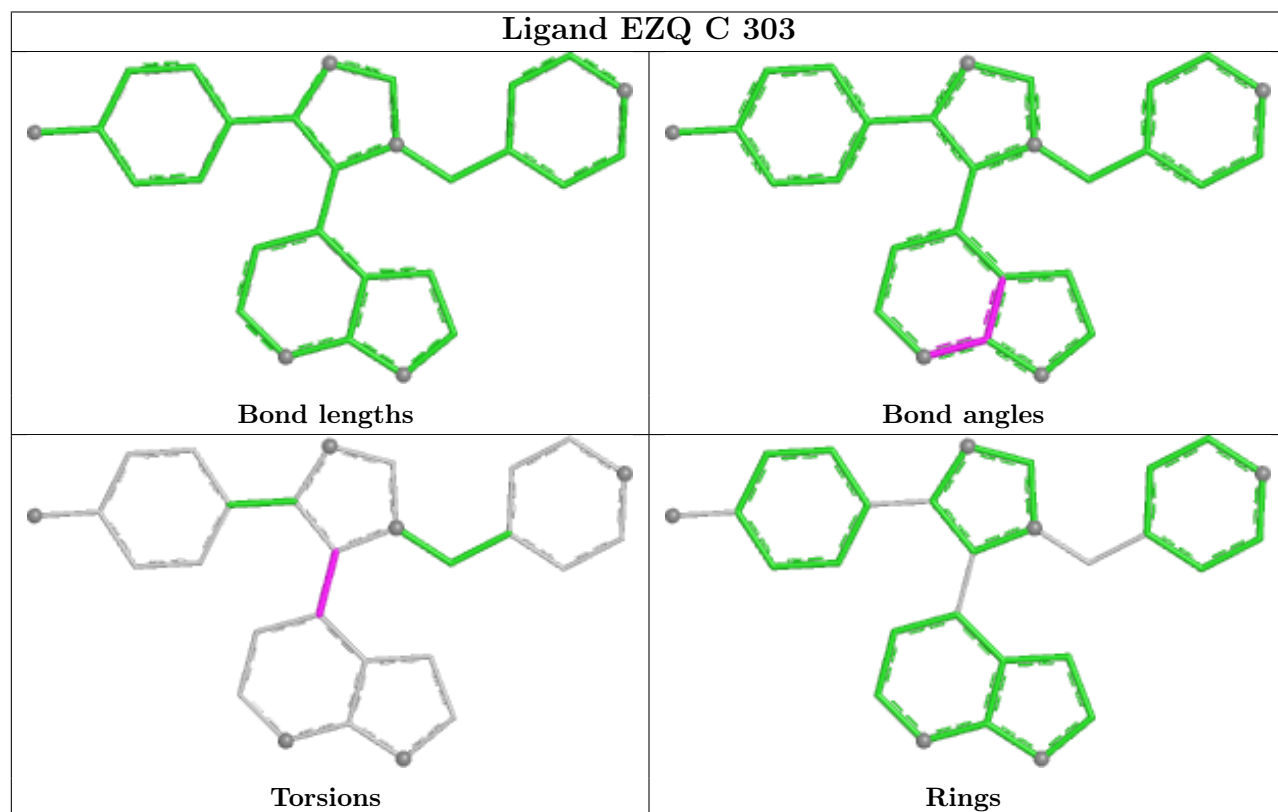
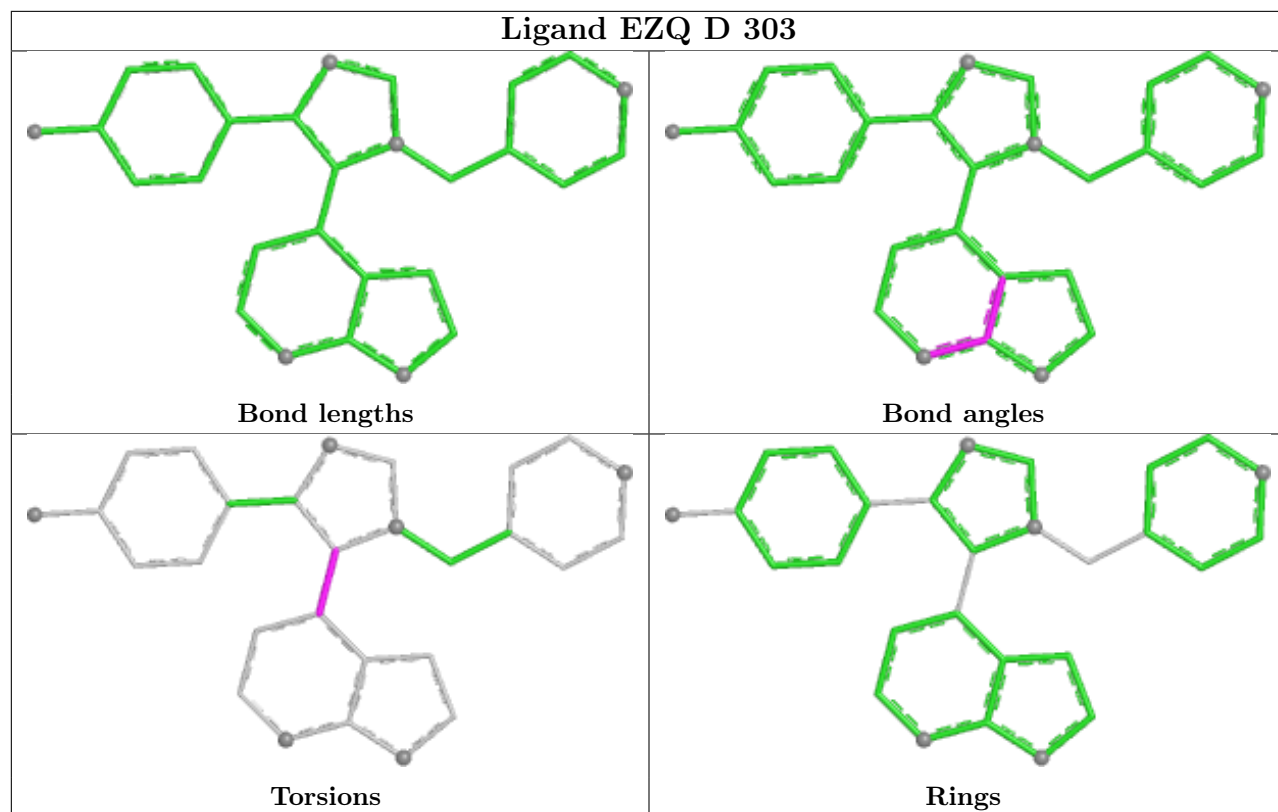
Mol	Chain	Res	Type	Atoms
4	A	312	EZQ	C21-C15-C7-C6
4	A	312	EZQ	C16-C15-C7-C6
4	B	304	EZQ	C21-C15-C7-C6
4	B	304	EZQ	C16-C15-C7-C6
3	A	304	EDO	O1-C1-C2-O2
4	A	312	EZQ	C21-C15-C7-N
4	B	304	EZQ	C21-C15-C7-N
4	C	303	EZQ	C21-C15-C7-N
4	C	303	EZQ	C21-C15-C7-C6
3	A	310	EDO	O1-C1-C2-O2
3	B	303	EDO	O1-C1-C2-O2
4	D	303	EZQ	C21-C15-C7-N
3	A	308	EDO	O1-C1-C2-O2
4	B	304	EZQ	C16-C15-C7-N

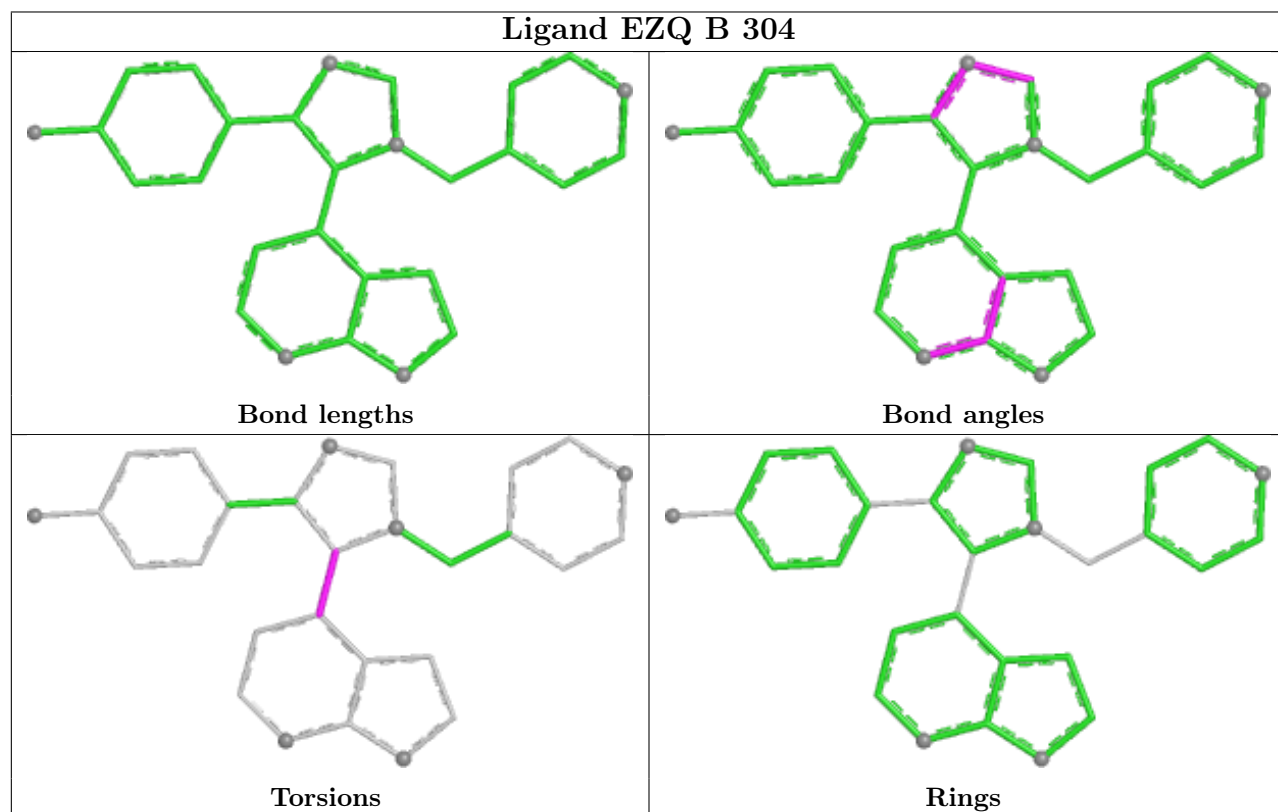
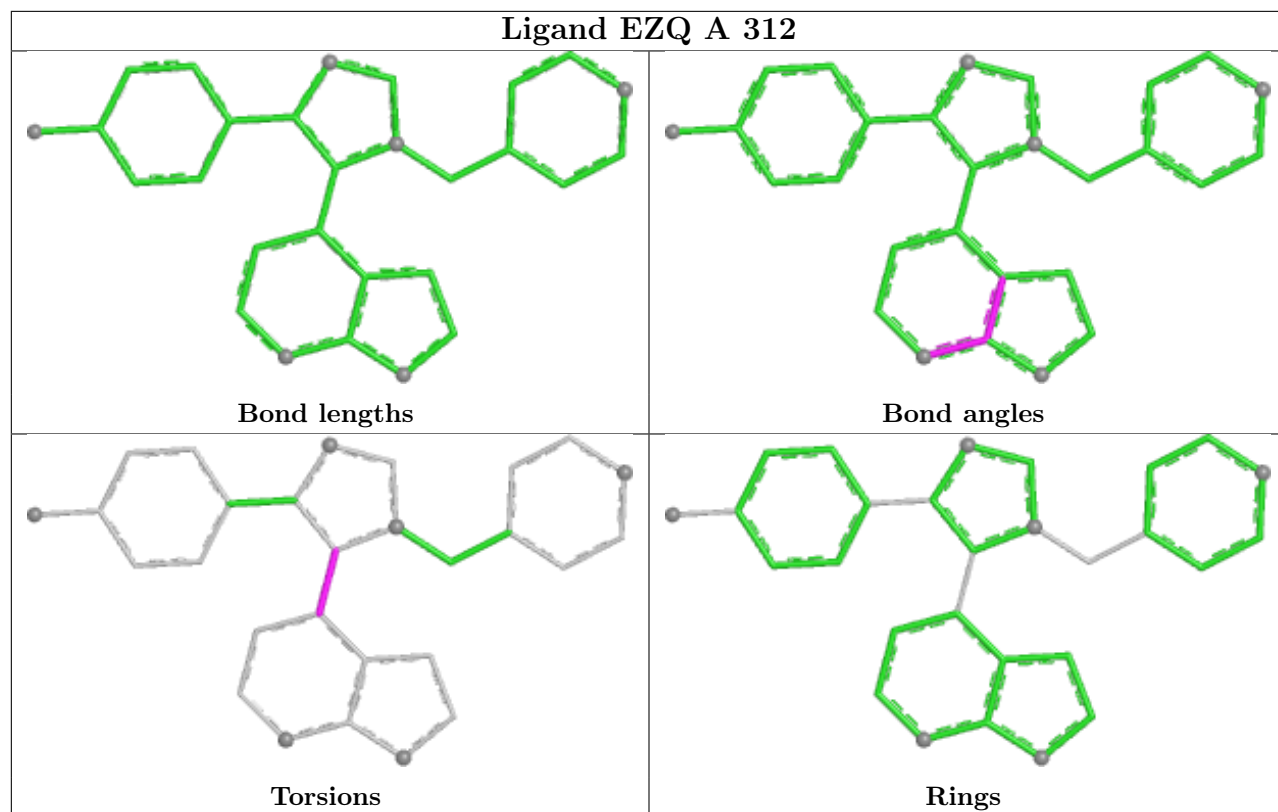
There are no ring outliers.

3 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	306	EDO	2	0
3	A	310	EDO	4	0
3	A	303	EDO	1	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 [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 [i](#)

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

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	289/296 (97%)	1.17	52 (17%) 3 4	16, 29, 61, 84	0
1	B	291/296 (98%)	1.29	64 (21%) 2 2	15, 30, 67, 85	1 (0%)
1	C	283/296 (95%)	1.50	71 (25%) 1 2	14, 32, 81, 113	1 (0%)
1	D	283/296 (95%)	1.46	68 (24%) 2 2	14, 32, 75, 86	1 (0%)
All	All	1146/1184 (96%)	1.35	255 (22%) 2 2	14, 30, 71, 113	3 (0%)

All (255) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	170	ASN	7.9
1	C	45	LYS	7.6
1	C	42	VAL	7.4
1	C	44	THR	7.2
1	C	173	LEU	6.6
1	C	17	SER	6.4
1	D	170	ASN	6.3
1	D	166	PRO	6.2
1	C	3	LEU	6.2
1	C	165	ILE	6.0
1	B	219	ALA	5.9
1	A	3	LEU	5.8
1	D	165	ILE	5.6
1	D	44	THR	5.5
1	B	3	LEU	5.4
1	D	167	TYR	5.3
1	A	170	ASN	5.2
1	C	172	ASN	5.1
1	D	173	LEU	5.1
1	C	167	TYR	5.1
1	D	172	ASN	5.0

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Mol	Chain	Res	Type	RSRZ
1	C	174	THR	4.8
1	B	2	GLU	4.7
1	C	168	ARG	4.6
1	D	175	GLY	4.6
1	B	18	GLY	4.5
1	A	174	THR	4.5
1	B	16	GLY	4.5
1	C	47	PRO	4.4
1	D	42	VAL	4.4
1	D	187	GLY	4.4
1	D	3	LEU	4.4
1	D	45	LYS	4.4
1	C	164	HIS	4.3
1	D	176	THR	4.3
1	B	76	ASP	4.3
1	D	174	THR	4.3
1	D	164	HIS	4.3
1	D	225	TYR	4.2
1	A	46	HIS	4.2
1	C	225	TYR	4.2
1	C	169	GLU	4.2
1	A	17	SER	4.1
1	D	51	ILE	4.0
1	D	17	SER	4.0
1	D	157	ARG	4.0
1	A	44	THR	4.0
1	C	166	PRO	3.9
1	C	171	LYS	3.9
1	D	171	LYS	3.9
1	D	15	ILE	3.9
1	A	15	ILE	3.8
1	D	58	MET	3.8
1	B	44	THR	3.8
1	B	220	THR	3.8
1	C	15	ILE	3.8
1	B	172	ASN	3.7
1	C	50	HIS	3.7
1	A	173	LEU	3.7
1	C	6	GLY	3.7
1	D	168	ARG	3.7
1	D	50	HIS	3.7
1	B	174	THR	3.6

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Mol	Chain	Res	Type	RSRZ
1	D	219	ALA	3.6
1	A	45	LYS	3.6
1	D	54	LYS	3.6
1	B	17	SER	3.6
1	D	220	THR	3.6
1	C	176	THR	3.6
1	C	220	THR	3.5
1	C	219	ALA	3.5
1	B	225	TYR	3.5
1	B	71	CYS	3.5
1	B	15	ILE	3.4
1	A	172	ASN	3.4
1	D	222	ARG	3.4
1	C	43	LYS	3.4
1	C	41	CYS	3.4
1	B	21	GLY	3.4
1	A	58	MET	3.4
1	B	173	LEU	3.4
1	D	256[A]	ARG	3.4
1	B	6	GLY	3.4
1	B	58	MET	3.3
1	D	156	TYR	3.3
1	C	218	ALA	3.3
1	B	217	LYS	3.3
1	C	16	GLY	3.3
1	D	21	GLY	3.3
1	B	286	TYR	3.3
1	C	21	GLY	3.2
1	A	76	ASP	3.2
1	C	272	LEU	3.2
1	A	161	THR	3.2
1	C	51	ILE	3.2
1	B	169	GLU	3.2
1	A	219	ALA	3.1
1	C	216	LEU	3.1
1	C	58	MET	3.1
1	D	261	ASP	3.1
1	B	223	GLN	3.1
1	D	281	GLY	3.1
1	B	218	ALA	3.0
1	D	47	PRO	3.0
1	A	225	TYR	3.0

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Mol	Chain	Res	Type	RSRZ
1	C	49	LEU	3.0
1	D	216	LEU	3.0
1	B	75	GLY	3.0
1	C	151	GLY	3.0
1	C	226	GLU	3.0
1	B	46	HIS	3.0
1	B	23	ILE	3.0
1	A	168	ARG	3.0
1	C	156	TYR	3.0
1	A	159	ALA	2.9
1	B	230	GLU	2.9
1	B	170	ASN	2.9
1	B	24	TYR	2.9
1	B	167	TYR	2.9
1	B	159	ALA	2.9
1	C	215	GLY	2.8
1	A	222	ARG	2.8
1	A	42	VAL	2.8
1	C	157	ARG	2.8
1	D	77	TYR	2.8
1	C	46	HIS	2.8
1	D	76	ASP	2.8
1	C	187	GLY	2.8
1	C	292	MET	2.8
1	C	55	ILE	2.8
1	A	217	LYS	2.8
1	A	162	HIS	2.7
1	B	161	THR	2.7
1	A	47	PRO	2.7
1	D	41	CYS	2.7
1	D	169	GLU	2.7
1	D	221	LYS	2.7
1	D	125	ILE	2.7
1	C	175	GLY	2.7
1	A	41	CYS	2.7
1	D	135	LEU	2.7
1	C	22	ASP	2.7
1	C	223	GLN	2.7
1	D	226	GLU	2.6
1	A	50	HIS	2.6
1	A	63	VAL	2.6
1	B	228	ILE	2.6

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Mol	Chain	Res	Type	RSRZ
1	D	218	ALA	2.6
1	C	222	ARG	2.6
1	A	72	GLY	2.6
1	C	217	LYS	2.6
1	D	75	GLY	2.5
1	B	95	PHE	2.5
1	C	294	LYS	2.5
1	D	46	HIS	2.5
1	C	221	LYS	2.5
1	D	5	VAL	2.5
1	C	261	ASP	2.5
1	A	71	CYS	2.5
1	D	16	GLY	2.5
1	C	63	VAL	2.5
1	A	24	TYR	2.5
1	C	256[A]	ARG	2.4
1	B	134	PHE	2.4
1	A	165	ILE	2.4
1	B	79	VAL	2.4
1	B	129	VAL	2.4
1	B	171	LYS	2.4
1	D	48	GLN	2.4
1	D	6	GLY	2.4
1	D	278	HIS	2.4
1	A	74	GLU	2.4
1	B	166	PRO	2.4
1	A	175	GLY	2.4
1	D	73	ALA	2.4
1	D	55	ILE	2.4
1	B	4	ARG	2.4
1	A	75	GLY	2.3
1	D	43	LYS	2.3
1	B	41	CYS	2.3
1	C	5	VAL	2.3
1	C	278	HIS	2.3
1	A	21	GLY	2.3
1	C	72	GLY	2.3
1	D	260	PHE	2.3
1	C	293	LEU	2.3
1	B	294	LYS	2.3
1	B	47	PRO	2.3
1	C	77	TYR	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	73	ALA	2.3
1	B	292	MET	2.3
1	D	233	MET	2.3
1	D	4	ARG	2.3
1	D	106	LEU	2.3
1	A	7	ASN	2.3
1	B	285	ASP	2.3
1	A	6	GLY	2.3
1	A	286	TYR	2.3
1	A	293	LEU	2.2
1	D	276	LEU	2.2
1	B	22	ASP	2.2
1	C	4	ARG	2.2
1	D	223	GLN	2.2
1	A	281	GLY	2.2
1	B	50	HIS	2.2
1	D	31	ALA	2.2
1	A	54	LYS	2.2
1	C	73	ALA	2.2
1	B	77	TYR	2.2
1	C	106	LEU	2.2
1	D	49	LEU	2.2
1	A	5	VAL	2.2
1	C	181	SER	2.2
1	A	4	ARG	2.1
1	B	216	LEU	2.1
1	D	63	VAL	2.1
1	B	45	LYS	2.1
1	B	163	GLN	2.1
1	D	280	GLN	2.1
1	B	222	ARG	2.1
1	C	13	ARG	2.1
1	A	82	MET	2.1
1	C	182	ILE	2.1
1	D	292	MET	2.1
1	A	14	LYS	2.1
1	B	43	LYS	2.1
1	C	224	LYS	2.1
1	B	42	VAL	2.1
1	C	70	TRP	2.1
1	A	95	PHE	2.1
1	B	48	GLN	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	176	THR	2.1
1	A	294	LYS	2.1
1	C	7	ASN	2.1
1	B	175	GLY	2.1
1	A	283	SER	2.1
1	A	171	LYS	2.1
1	B	221	LYS	2.1
1	C	99	LYS	2.1
1	C	23	ILE	2.1
1	A	16	GLY	2.1
1	B	200	GLY	2.1
1	C	40	GLU	2.0
1	B	11	LEU	2.0
1	C	285	ASP	2.0
1	B	224	LYS	2.0
1	D	217	LYS	2.0
1	B	74	GLU	2.0
1	D	40	GLU	2.0
1	A	31	ALA	2.0
1	A	223	GLN	2.0
1	B	162	HIS	2.0
1	B	271	GLN	2.0
1	A	119	ILE	2.0
1	D	119	ILE	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](#)

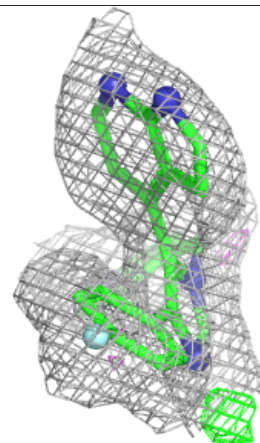
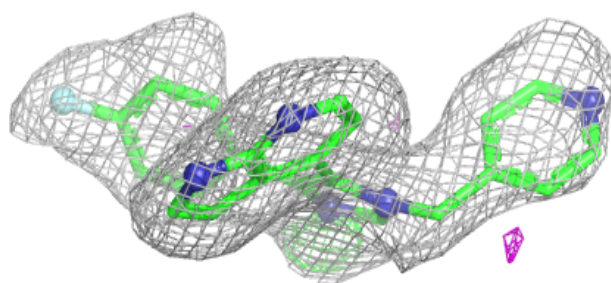
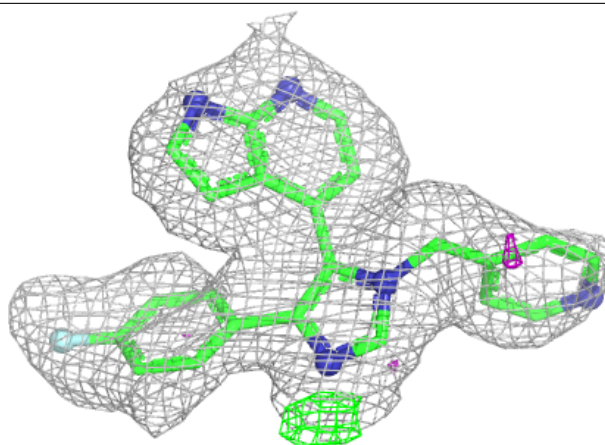
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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
3	EDO	A	310	4/4	0.65	0.18	36,37,37,38	0
3	EDO	A	304	4/4	0.69	0.20	45,45,46,49	0
3	EDO	A	308	4/4	0.74	0.17	39,43,45,49	0
3	EDO	A	305	4/4	0.75	0.15	39,41,41,41	0
3	EDO	A	303	4/4	0.76	0.17	39,41,42,42	0
3	EDO	A	311	4/4	0.82	0.17	34,35,35,35	0
2	SO4	A	302	5/5	0.85	0.09	55,57,58,62	0
3	EDO	B	303	4/4	0.85	0.14	45,45,47,48	0
4	EZQ	B	304	28/28	0.85	0.13	24,32,43,46	0
4	EZQ	C	303	28/28	0.86	0.12	23,29,42,43	0
3	EDO	A	307	4/4	0.87	0.22	39,40,42,45	0
4	EZQ	A	312	28/28	0.89	0.10	24,30,37,38	0
3	EDO	A	306	4/4	0.89	0.21	33,39,39,41	0
2	SO4	B	302	5/5	0.89	0.09	57,61,62,64	0
4	EZQ	D	303	28/28	0.89	0.11	22,32,40,40	0
3	EDO	A	309	4/4	0.90	0.13	35,37,38,39	0
2	SO4	A	301	5/5	0.92	0.09	33,36,38,39	0
2	SO4	D	301	5/5	0.93	0.08	38,40,43,45	0
2	SO4	B	301	5/5	0.93	0.12	45,46,48,49	0
2	SO4	C	302	5/5	0.93	0.10	36,38,40,43	0
2	SO4	C	301	5/5	0.95	0.10	44,45,46,49	0
2	SO4	D	302	5/5	0.96	0.10	43,43,48,52	0

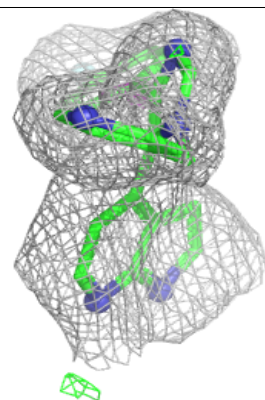
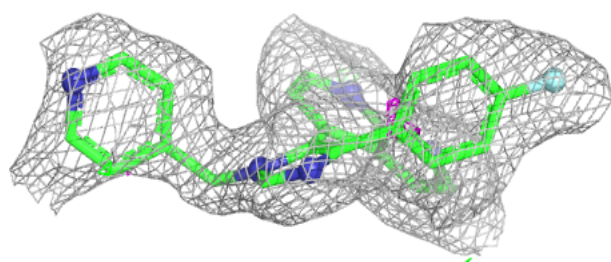
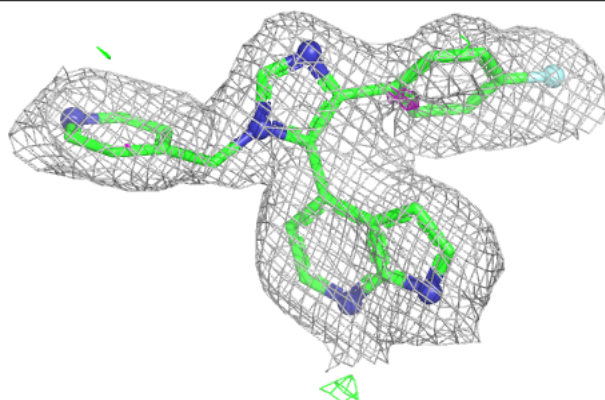
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around EZQ B 304:

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

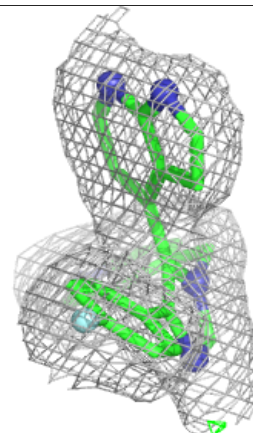
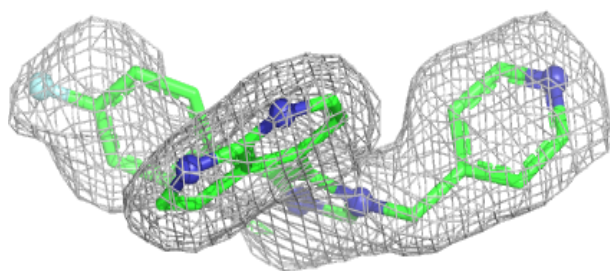
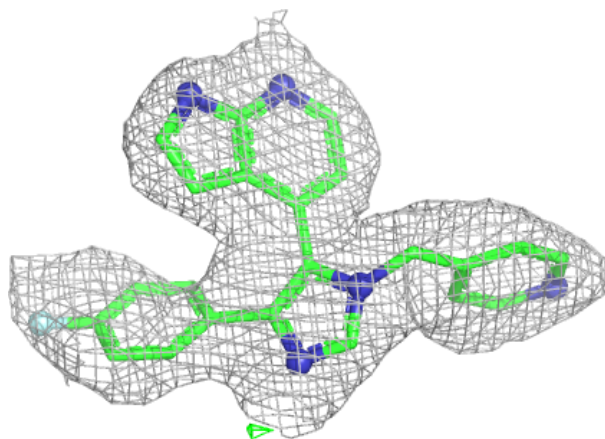
**Electron density around EZQ C 303:**

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

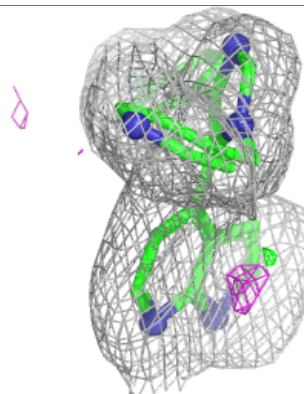
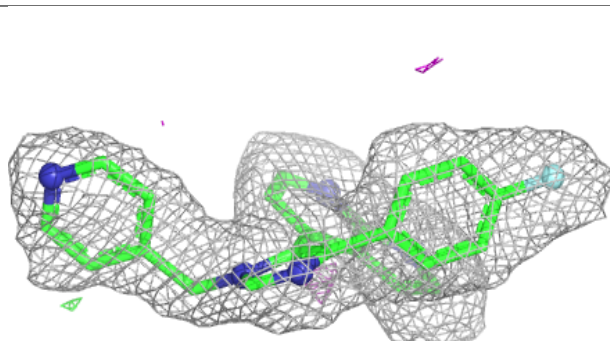
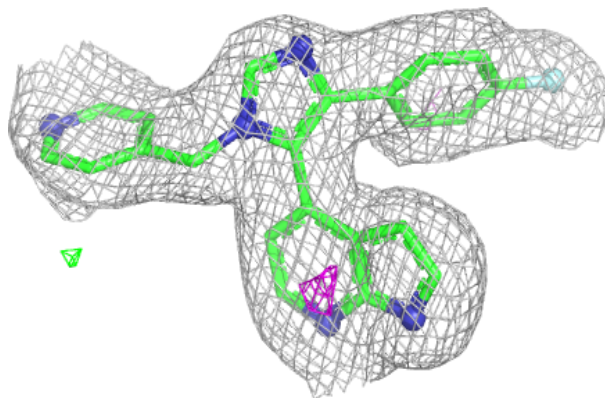


Electron density around EZQ A 312:

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

**Electron density around EZQ D 303:**

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



6.5 Other polymers [i](#)

There are no such residues in this entry.