



Full wwPDB X-ray Structure Validation Report ⓘ

May 23, 2020 – 06:49 pm BST

PDB ID : 3QK5
Title : Crystal structure of fatty acid amide hydrolase with small molecule inhibitor
Authors : Min, X.; Walker, N.P.C.; Wang, Z.
Deposited on : 2011-01-31
Resolution : 2.20 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 : 2.11
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.11

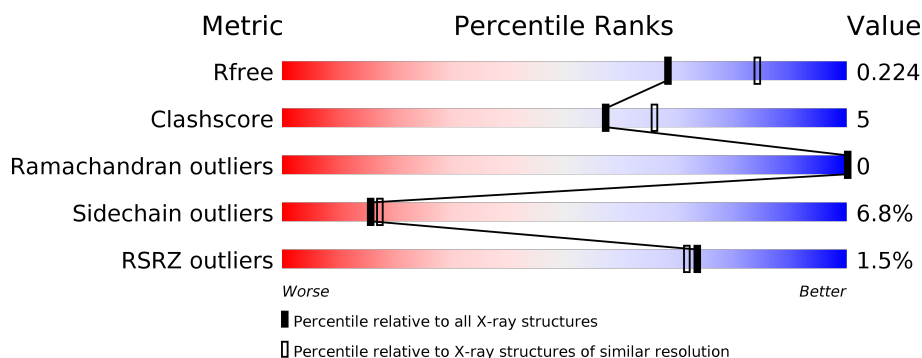
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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}	130704	4898 (2.20-2.20)
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)
RSRZ outliers	127900	4800 (2.20-2.20)

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 $\leq 5\%$. 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	587	<div> <div>%</div> <div> <div></div> <div>83%</div> <div>9%</div> <div>6%</div> </div> </div>
1	B	587	<div> <div>2%</div> <div> <div></div> <div>79%</div> <div>12%</div> <div>7%</div> </div> </div>

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 9545 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 Fatty-acid amide hydrolase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	549	Total	C	N	O	S	0	10	0
			4275	2729	726	789	31			
1	B	546	Total	C	N	O	S	0	10	0
			4255	2716	729	780	30			

There are 78 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-7	MET	-	EXPRESSION TAG	UNP P97612
A	-6	GLY	-	EXPRESSION TAG	UNP P97612
A	-5	GLY	-	EXPRESSION TAG	UNP P97612
A	-4	SER	-	EXPRESSION TAG	UNP P97612
A	-3	HIS	-	EXPRESSION TAG	UNP P97612
A	-2	HIS	-	EXPRESSION TAG	UNP P97612
A	-1	HIS	-	EXPRESSION TAG	UNP P97612
A	0	HIS	-	EXPRESSION TAG	UNP P97612
A	1	HIS	-	EXPRESSION TAG	UNP P97612
A	2	HIS	-	EXPRESSION TAG	UNP P97612
A	3	GLY	-	EXPRESSION TAG	UNP P97612
A	4	MET	-	EXPRESSION TAG	UNP P97612
A	5	ALA	-	EXPRESSION TAG	UNP P97612
A	6	SER	-	EXPRESSION TAG	UNP P97612
A	7	MET	-	EXPRESSION TAG	UNP P97612
A	8	THR	-	EXPRESSION TAG	UNP P97612
A	9	GLY	-	EXPRESSION TAG	UNP P97612
A	10	GLY	-	EXPRESSION TAG	UNP P97612
A	11	GLN	-	EXPRESSION TAG	UNP P97612
A	12	GLN	-	EXPRESSION TAG	UNP P97612
A	13	MET	-	EXPRESSION TAG	UNP P97612
A	14	GLY	-	EXPRESSION TAG	UNP P97612
A	15	ARG	-	EXPRESSION TAG	UNP P97612
A	16	ASP	-	EXPRESSION TAG	UNP P97612
A	17	LEU	-	EXPRESSION TAG	UNP P97612

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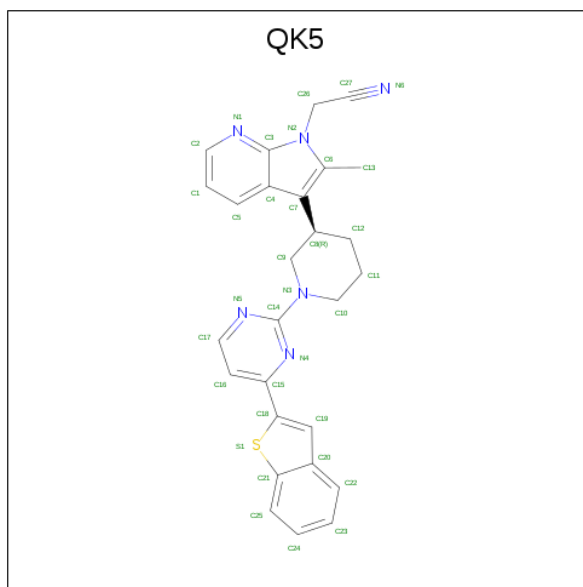
Chain	Residue	Modelled	Actual	Comment	Reference
A	18	TYR	-	EXPRESSION TAG	UNP P97612
A	19	ASP	-	EXPRESSION TAG	UNP P97612
A	20	ASP	-	EXPRESSION TAG	UNP P97612
A	21	ASP	-	EXPRESSION TAG	UNP P97612
A	22	ASP	-	EXPRESSION TAG	UNP P97612
A	23	LYS	-	EXPRESSION TAG	UNP P97612
A	24	ASP	-	EXPRESSION TAG	UNP P97612
A	25	ARG	-	EXPRESSION TAG	UNP P97612
A	26	TRP	-	EXPRESSION TAG	UNP P97612
A	27	GLY	-	EXPRESSION TAG	UNP P97612
A	28	SER	-	EXPRESSION TAG	UNP P97612
A	29	GLU	-	EXPRESSION TAG	UNP P97612
A	30	LEU	-	EXPRESSION TAG	UNP P97612
A	31	GLU	-	EXPRESSION TAG	UNP P97612
B	-7	MET	-	EXPRESSION TAG	UNP P97612
B	-6	GLY	-	EXPRESSION TAG	UNP P97612
B	-5	GLY	-	EXPRESSION TAG	UNP P97612
B	-4	SER	-	EXPRESSION TAG	UNP P97612
B	-3	HIS	-	EXPRESSION TAG	UNP P97612
B	-2	HIS	-	EXPRESSION TAG	UNP P97612
B	-1	HIS	-	EXPRESSION TAG	UNP P97612
B	0	HIS	-	EXPRESSION TAG	UNP P97612
B	1	HIS	-	EXPRESSION TAG	UNP P97612
B	2	HIS	-	EXPRESSION TAG	UNP P97612
B	3	GLY	-	EXPRESSION TAG	UNP P97612
B	4	MET	-	EXPRESSION TAG	UNP P97612
B	5	ALA	-	EXPRESSION TAG	UNP P97612
B	6	SER	-	EXPRESSION TAG	UNP P97612
B	7	MET	-	EXPRESSION TAG	UNP P97612
B	8	THR	-	EXPRESSION TAG	UNP P97612
B	9	GLY	-	EXPRESSION TAG	UNP P97612
B	10	GLY	-	EXPRESSION TAG	UNP P97612
B	11	GLN	-	EXPRESSION TAG	UNP P97612
B	12	GLN	-	EXPRESSION TAG	UNP P97612
B	13	MET	-	EXPRESSION TAG	UNP P97612
B	14	GLY	-	EXPRESSION TAG	UNP P97612
B	15	ARG	-	EXPRESSION TAG	UNP P97612
B	16	ASP	-	EXPRESSION TAG	UNP P97612
B	17	LEU	-	EXPRESSION TAG	UNP P97612
B	18	TYR	-	EXPRESSION TAG	UNP P97612
B	19	ASP	-	EXPRESSION TAG	UNP P97612
B	20	ASP	-	EXPRESSION TAG	UNP P97612

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Chain	Residue	Modelled	Actual	Comment	Reference
B	21	ASP	-	EXPRESSION TAG	UNP P97612
B	22	ASP	-	EXPRESSION TAG	UNP P97612
B	23	LYS	-	EXPRESSION TAG	UNP P97612
B	24	ASP	-	EXPRESSION TAG	UNP P97612
B	25	ARG	-	EXPRESSION TAG	UNP P97612
B	26	TRP	-	EXPRESSION TAG	UNP P97612
B	27	GLY	-	EXPRESSION TAG	UNP P97612
B	28	SER	-	EXPRESSION TAG	UNP P97612
B	29	GLU	-	EXPRESSION TAG	UNP P97612
B	30	LEU	-	EXPRESSION TAG	UNP P97612
B	31	GLU	-	EXPRESSION TAG	UNP P97612

- Molecule 2 is (3-((3R)-1-[4-(1-benzothiophen-2-yl)pyrimidin-2-yl]piperidin-3-yl)-2-methyl-1H-pyrrolo[2,3-b]pyridin-1-yl)acetonitrile (three-letter code: QK5) (formula: C₂₇H₂₄N₆S).





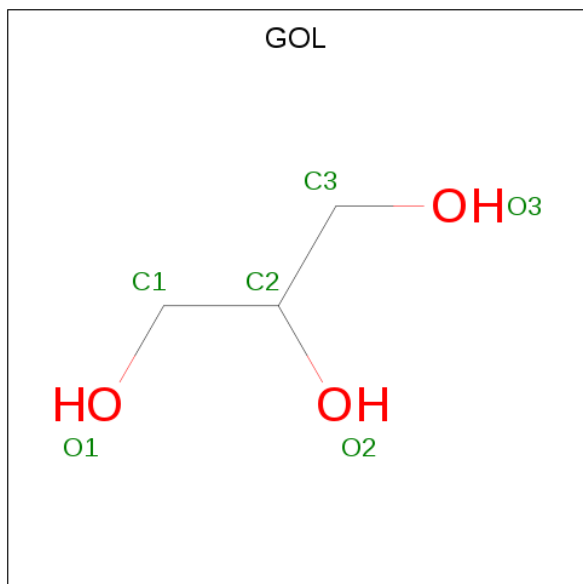
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total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

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

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			6	3	3		

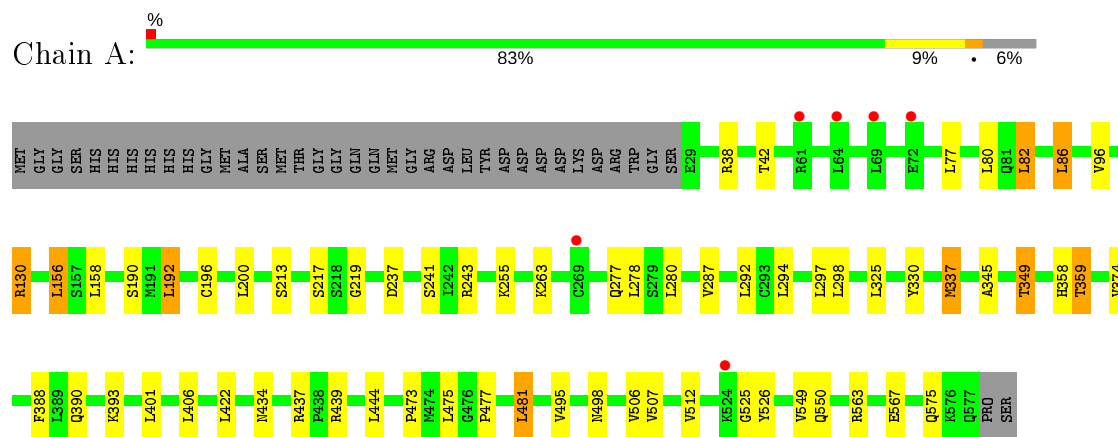
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	410	Total	O	0	0
			410	410		
5	B	471	Total	O	0	0
			471	471		

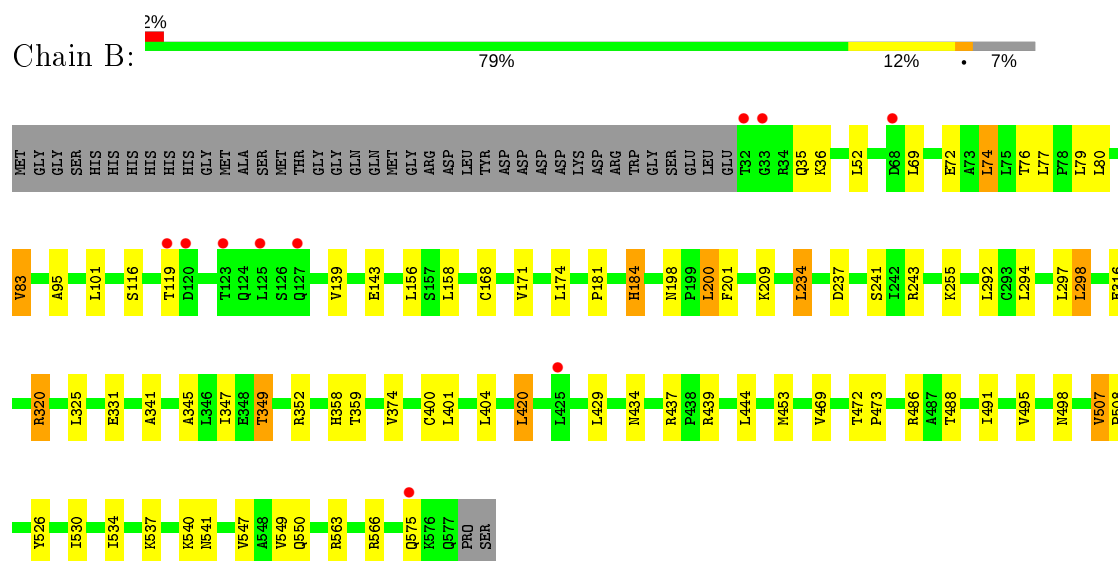
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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: Fatty-acid amide hydrolase 1



- Molecule 1: Fatty-acid amide hydrolase 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	91.43Å 104.70Å 148.60Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.86 – 2.20 29.86 – 2.20	Depositor EDS
% Data completeness (in resolution range)	99.2 (29.86-2.20) 99.2 (29.86-2.20)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	0.12	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.59 (at 2.20Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.184 , 0.224 0.184 , 0.224	Depositor DCC
R_{free} test set	3648 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å ²)	19.9	Xtriage
Anisotropy	0.123	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 46.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	9545	wwPDB-VP
Average B, all atoms (Å ²)	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.50% 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: GOL, EDO, QK5

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	0.39	0/4398	0.57	0/5964
1	B	0.39	0/4378	0.58	2/5935 (0.0%)
All	All	0.39	0/8776	0.58	2/11899 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	420	LEU	CA-CB-CG	5.25	127.37	115.30
1	B	74	LEU	CA-CB-CG	5.17	127.18	115.30

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	A	4275	0	4357	41	0
1	B	4255	0	4349	43	0
2	A	34	0	24	3	0
2	B	34	0	24	1	0
3	A	24	0	36	0	0
3	B	36	0	54	4	0
4	A	6	0	8	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	410	0	0	3	0
5	B	471	0	0	2	0
All	All	9545	0	8852	86	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 (86) 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:352:ARG:HH11	1:B:352:ARG:HG3	1.38	0.89
1:A:325:LEU:H	1:A:358:HIS:HD2	1.17	0.88
1:B:325:LEU:H	1:B:358:HIS:HD2	1.23	0.86
1:B:345:ALA:O	1:B:349:THR:HG23	1.79	0.82
1:A:130:ARG:CG	1:A:130:ARG:HH21	1.95	0.80
1:A:495:VAL:HA	1:A:498:ASN:HD22	1.50	0.77
1:A:263:LYS:HE3	1:A:278:LEU:O	1.89	0.72
1:B:472:THR:HG22	1:B:473:PRO:O	1.89	0.71
1:A:192:LEU:HG	1:A:388:PHE:CE1	2.27	0.70
1:A:130:ARG:HG2	1:A:130:ARG:HH21	1.58	0.68
1:B:198:ASN:HD22	1:B:200:LEU:H	1.40	0.68
1:B:198:ASN:HD21	1:B:201:PHE:H	1.40	0.67
1:B:495:VAL:HA	1:B:498:ASN:HD22	1.61	0.65
1:B:472:THR:HG21	1:B:550:GLN:HE21	1.60	0.64
1:A:325:LEU:H	1:A:358:HIS:CD2	2.09	0.63
1:B:352:ARG:NH1	1:B:352:ARG:HG3	2.11	0.62
1:B:325:LEU:H	1:B:358:HIS:CD2	2.13	0.62
1:A:192:LEU:HD22	2:A:600:QK5:C2	2.30	0.61
1:A:345:ALA:O	1:A:349:THR:HG23	2.00	0.61
1:B:198:ASN:ND2	1:B:201:PHE:H	2.00	0.59
1:B:434:ASN:HD21	1:B:437:ARG:HH11	1.52	0.58
1:A:38:ARG:O	1:A:42:THR:HG23	2.03	0.58
1:A:358:HIS:HE1	1:A:567:GLU:OE1	1.87	0.57
1:A:42:THR:HG21	5:A:978:HOH:O	2.04	0.56
1:A:243:ARG:HH22	1:A:498:ASN:ND2	2.04	0.56
1:B:325:LEU:N	1:B:358:HIS:HD2	2.00	0.56
1:B:434:ASN:ND2	1:B:437:ARG:HH11	2.04	0.55
1:B:79:LEU:O	1:B:83:VAL:HG13	2.07	0.55
1:A:345:ALA:O	1:A:349:THR:CG2	2.55	0.55
1:A:243:ARG:NH2	1:A:498:ASN:HD21	2.06	0.53
2:B:600:QK5:H5	2:B:600:QK5:H12	1.90	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:168:CYS:SG	1:B:171:VAL:HG23	2.49	0.53
1:B:486:ARG:HB3	1:B:534:ILE:HD13	1.91	0.52
1:B:540:LYS:HD3	3:B:588:EDO:H22	1.91	0.52
1:B:294:LEU:HG	1:B:298:LEU:HD22	1.91	0.51
1:A:243:ARG:HH11	1:A:550:GLN:HE22	1.59	0.51
1:A:243:ARG:HH11	1:A:550:GLN:NE2	2.09	0.51
2:A:600:QK5:H5	2:A:600:QK5:H12	1.93	0.50
1:B:575:GLN:HG2	5:B:880:HOH:O	2.12	0.50
1:A:217:SER:H	1:A:241:SER:CB	2.25	0.49
1:A:390:GLN:HE21	1:A:393:LYS:HE2	1.77	0.49
1:A:477:PRO:HG3	1:A:512:VAL:HG21	1.95	0.49
1:B:341:ALA:HB1	1:B:547:VAL:HG21	1.95	0.49
1:A:359:THR:HG22	5:A:743:HOH:O	2.12	0.48
1:A:337:MET:HG2	1:A:526:TYR:CZ	2.48	0.47
1:A:130:ARG:HH21	1:A:130:ARG:HG3	1.75	0.47
1:B:316:GLU:OE1	1:B:320:ARG:HD2	2.15	0.47
1:A:130:ARG:HD3	1:A:130:ARG:O	2.15	0.47
1:A:434:ASN:HD21	1:A:437:ARG:HH11	1.63	0.47
1:A:190[B]:SER:HG	1:A:388:PHE:HE1	1.62	0.46
1:B:453[B]:MET:CE	1:B:453[B]:MET:HA	2.47	0.45
1:B:472:THR:CG2	1:B:550:GLN:HE21	2.27	0.45
1:A:243:ARG:HD2	1:A:550:GLN:HE21	1.81	0.45
1:A:330:TYR:O	1:A:473:PRO:HD3	2.16	0.45
1:B:69:LEU:HD11	1:B:95:ALA:HB1	1.99	0.44
1:B:243:ARG:NH2	1:B:498:ASN:HD21	2.16	0.44
1:A:390:GLN:HE21	1:A:393:LYS:CE	2.31	0.44
1:A:325:LEU:N	1:A:358:HIS:HD2	1.98	0.44
1:A:196:CYS:SG	1:A:219:GLY:HA3	2.58	0.43
1:B:116:SER:HB3	1:B:184:HIS:HB2	2.00	0.43
1:B:72:GLU:O	1:B:76:THR:HG23	2.19	0.43
1:B:139:VAL:O	1:B:181:PRO:HA	2.19	0.42
1:B:541[B]:ASN:ND2	3:B:588:EDO:H21	2.34	0.42
1:A:213:SER:HA	1:A:481:LEU:HD13	2.02	0.42
1:B:352:ARG:CG	1:B:352:ARG:NH1	2.79	0.42
1:A:434:ASN:ND2	1:A:437:ARG:HH11	2.17	0.42
1:B:36:LYS:HG2	5:B:1020:HOH:O	2.20	0.41
1:B:237:ASP:HB3	1:B:255:LYS:HG3	2.02	0.41
1:A:130:ARG:NH2	1:A:130:ARG:CG	2.65	0.41
1:A:237:ASP:HB3	1:A:255:LYS:HG3	2.03	0.41
1:B:237:ASP:HA	1:B:241:SER:HB2	2.03	0.41
1:B:331:GLU:OE2	1:B:347:ILE:HD11	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:429:LEU:HD21	1:B:530:ILE:HG12	2.02	0.41
1:A:156:LEU:HB3	1:A:158:LEU:HD23	2.02	0.41
1:A:337:MET:HB2	1:A:525:GLY:HA2	2.02	0.41
1:B:507:VAL:HA	1:B:508:PRO:HD3	1.96	0.41
1:B:526:TYR:HB3	3:B:583:EDO:H21	2.02	0.41
1:A:82:LEU:HD22	1:A:86:LEU:HD22	2.03	0.41
1:B:488:THR:O	1:B:491:ILE:HG12	2.21	0.41
1:B:174:LEU:HD11	1:B:234:LEU:HD22	2.02	0.41
1:B:566:ARG:HH22	3:B:585:EDO:C2	2.34	0.41
1:A:277:GLN:NE2	5:A:752:HOH:O	2.48	0.41
1:A:243:ARG:HD2	1:A:550:GLN:NE2	2.36	0.41
1:A:192:LEU:HD13	2:A:600:QK5:C1	2.51	0.40
1:B:243:ARG:HH22	1:B:498:ASN:ND2	2.19	0.40

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	557/587 (95%)	545 (98%)	12 (2%)	0	100	100
1	B	554/587 (94%)	543 (98%)	11 (2%)	0	100	100
All	All	1111/1174 (95%)	1088 (98%)	23 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

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	476/496 (96%)	445 (94%)	31 (6%)	17	19
1	B	473/496 (95%)	441 (93%)	32 (7%)	16	17
All	All	949/992 (96%)	886 (93%)	63 (7%)	16	19

All (63) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	77	LEU
1	A	80	LEU
1	A	82	LEU
1	A	86	LEU
1	A	96	VAL
1	A	130	ARG
1	A	156	LEU
1	A	192	LEU
1	A	200	LEU
1	A	280	LEU
1	A	287	VAL
1	A	292	LEU
1	A	294	LEU
1	A	297	LEU
1	A	298	LEU
1	A	337	MET
1	A	349	THR
1	A	359	THR
1	A	374	VAL
1	A	401	LEU
1	A	406	LEU
1	A	422	LEU
1	A	439	ARG
1	A	444	LEU
1	A	475	LEU
1	A	481	LEU
1	A	506	VAL
1	A	507	VAL
1	A	549	VAL
1	A	563	ARG
1	A	575	GLN
1	B	35	GLN
1	B	52	LEU

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Mol	Chain	Res	Type
1	B	74	LEU
1	B	77	LEU
1	B	80	LEU
1	B	83	VAL
1	B	101	LEU
1	B	119	THR
1	B	143	GLU
1	B	156	LEU
1	B	158	LEU
1	B	184	HIS
1	B	200	LEU
1	B	234	LEU
1	B	292	LEU
1	B	297	LEU
1	B	298	LEU
1	B	320	ARG
1	B	349	THR
1	B	359	THR
1	B	374	VAL
1	B	400	CYS
1	B	401	LEU
1	B	404	LEU
1	B	420	LEU
1	B	439	ARG
1	B	444	LEU
1	B	469	VAL
1	B	507	VAL
1	B	537	LYS
1	B	549	VAL
1	B	563	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (27) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	124	GLN
1	A	127	GLN
1	A	159	ASN
1	A	203	GLN
1	A	259	ASN
1	A	334	ASN
1	A	351	GLN
1	A	358	HIS

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Mol	Chain	Res	Type
1	A	367	ASN
1	A	390	GLN
1	A	434	ASN
1	A	456	GLN
1	A	498	ASN
1	A	550	GLN
1	A	577	GLN
1	B	46	GLN
1	B	124	GLN
1	B	159	ASN
1	B	198	ASN
1	B	259	ASN
1	B	301	HIS
1	B	358	HIS
1	B	391	ASN
1	B	434	ASN
1	B	448	GLN
1	B	498	ASN
1	B	577	GLN

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 carbohydrates in this entry.

5.6 Ligand geometry ⓘ

18 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	QK5	A	600	-	34,39,39	1.40	5 (14%)	33,56,56	2.24	10 (30%)
3	EDO	B	584	-	3,3,3	0.48	0	2,2,2	0.28	0
3	EDO	A	586	-	3,3,3	0.48	0	2,2,2	0.30	0
3	EDO	B	588	-	3,3,3	0.53	0	2,2,2	0.12	0
3	EDO	A	582	-	3,3,3	0.46	0	2,2,2	0.33	0
3	EDO	A	581	-	3,3,3	0.43	0	2,2,2	0.31	0
3	EDO	A	585	-	3,3,3	0.47	0	2,2,2	0.28	0
3	EDO	A	580	-	3,3,3	0.39	0	2,2,2	0.48	0
2	QK5	B	600	-	34,39,39	1.35	4 (11%)	33,56,56	2.23	9 (27%)
3	EDO	B	585	-	3,3,3	0.45	0	2,2,2	0.39	0
3	EDO	A	584	-	3,3,3	0.43	0	2,2,2	0.38	0
3	EDO	B	582	-	3,3,3	0.48	0	2,2,2	0.30	0
4	GOL	A	583	-	5,5,5	0.45	0	5,5,5	0.18	0
3	EDO	B	583	-	3,3,3	0.48	0	2,2,2	0.29	0
3	EDO	B	586	-	3,3,3	0.47	0	2,2,2	0.32	0
3	EDO	B	581	-	3,3,3	0.45	0	2,2,2	0.34	0
3	EDO	B	587	-	3,3,3	0.43	0	2,2,2	0.42	0
3	EDO	B	580	-	3,3,3	0.49	0	2,2,2	0.24	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
2	QK5	A	600	-	-	0/6/25/25	0/6/6/6
3	EDO	B	584	-	-	1/1/1/1	-
3	EDO	A	586	-	-	0/1/1/1	-
3	EDO	B	588	-	-	1/1/1/1	-
3	EDO	A	582	-	-	0/1/1/1	-
3	EDO	A	581	-	-	1/1/1/1	-
3	EDO	A	585	-	-	1/1/1/1	-
3	EDO	A	580	-	-	0/1/1/1	-
2	QK5	B	600	-	-	0/6/25/25	0/6/6/6
3	EDO	B	585	-	-	1/1/1/1	-
3	EDO	A	584	-	-	1/1/1/1	-
3	EDO	B	582	-	-	1/1/1/1	-
4	GOL	A	583	-	-	2/4/4/4	-
3	EDO	B	583	-	-	1/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	EDO	B	586	-	-	0/1/1/1	-
3	EDO	B	581	-	-	1/1/1/1	-
3	EDO	B	587	-	-	1/1/1/1	-
3	EDO	B	580	-	-	0/1/1/1	-

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	600	QK5	C15-C18	-4.31	1.39	1.49
2	B	600	QK5	C15-C18	-4.16	1.39	1.49
2	A	600	QK5	C14-N3	3.02	1.41	1.35
2	B	600	QK5	C14-N3	2.71	1.40	1.35
2	A	600	QK5	C6-N2	-2.55	1.34	1.39
2	B	600	QK5	C6-N2	-2.50	1.34	1.39
2	A	600	QK5	C18-S1	-2.24	1.69	1.72
2	B	600	QK5	C13-C6	2.19	1.54	1.49
2	A	600	QK5	C10-N3	2.12	1.50	1.46

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	600	QK5	N5-C14-N4	-6.24	119.76	126.00
2	B	600	QK5	N5-C14-N4	-5.81	120.19	126.00
2	A	600	QK5	C17-N5-C14	5.31	120.95	115.08
2	B	600	QK5	C17-N5-C14	5.07	120.68	115.08
2	B	600	QK5	N5-C14-N3	4.72	122.01	116.90
2	A	600	QK5	N5-C14-N3	4.55	121.82	116.90
2	B	600	QK5	C2-N1-C3	3.99	121.73	116.77
2	A	600	QK5	C2-N1-C3	3.97	121.70	116.77
2	A	600	QK5	C13-C6-N2	3.32	126.86	122.69
2	B	600	QK5	C13-C6-N2	3.29	126.83	122.69
2	B	600	QK5	C16-C17-N5	-3.12	120.08	123.96
2	A	600	QK5	C16-C17-N5	-2.85	120.42	123.96
2	B	600	QK5	C16-C15-N4	-2.69	118.49	121.97
2	B	600	QK5	C10-N3-C9	2.52	119.90	112.55
2	A	600	QK5	C7-C6-N2	2.36	108.21	106.69
2	A	600	QK5	C10-N3-C9	2.29	119.22	112.55
2	A	600	QK5	C16-C15-N4	-2.09	119.25	121.97
2	A	600	QK5	C13-C6-C7	-2.02	124.93	128.71
2	B	600	QK5	C1-C2-N1	-2.02	120.84	123.94

There are no chirality outliers.

All (12) torsion outliers are listed below:

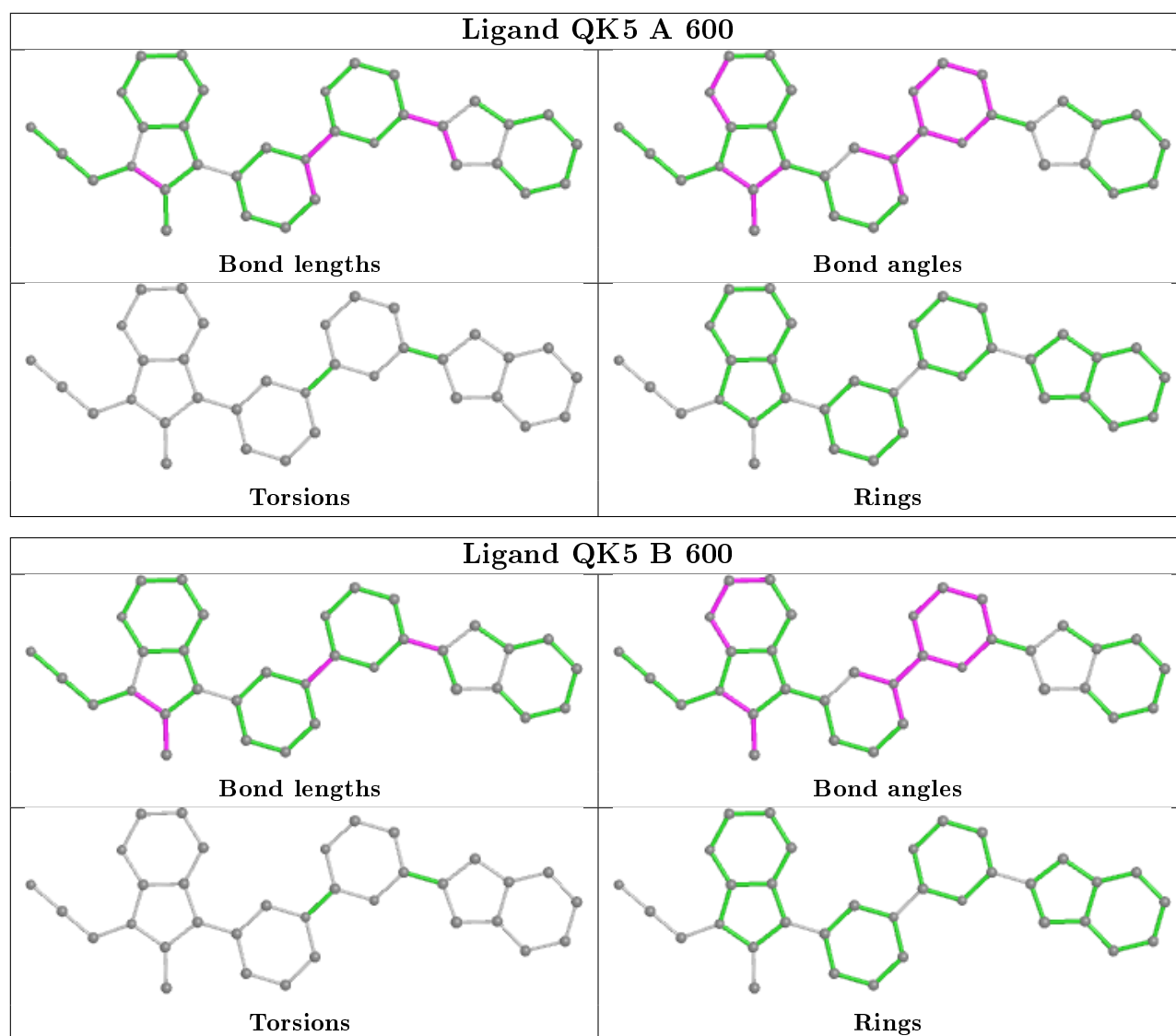
Mol	Chain	Res	Type	Atoms
4	A	583	GOL	C1-C2-C3-O3
4	A	583	GOL	O2-C2-C3-O3
3	B	584	EDO	O1-C1-C2-O2
3	A	581	EDO	O1-C1-C2-O2
3	A	585	EDO	O1-C1-C2-O2
3	A	584	EDO	O1-C1-C2-O2
3	B	583	EDO	O1-C1-C2-O2
3	B	587	EDO	O1-C1-C2-O2
3	B	588	EDO	O1-C1-C2-O2
3	B	581	EDO	O1-C1-C2-O2
3	B	585	EDO	O1-C1-C2-O2
3	B	582	EDO	O1-C1-C2-O2

There are no ring outliers.

5 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	600	QK5	3	0
3	B	588	EDO	2	0
2	B	600	QK5	1	0
3	B	585	EDO	1	0
3	B	583	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	549/587 (93%)	-0.23	6 (1%) 80 79	14, 21, 33, 48	0
1	B	546/587 (93%)	-0.24	10 (1%) 68 66	12, 19, 34, 42	0
All	All	1095/1174 (93%)	-0.24	16 (1%) 73 72	12, 20, 34, 48	0

All (16) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	32	THR	6.7
1	A	72	GLU	3.9
1	B	123	THR	3.5
1	B	127	GLN	3.0
1	B	33	GLY	3.0
1	B	575	GLN	3.0
1	B	425	LEU	2.6
1	B	120	ASP	2.5
1	B	125	LEU	2.4
1	B	119	THR	2.4
1	A	61	ARG	2.3
1	A	269	CYS	2.3
1	A	64	LEU	2.1
1	A	69	LEU	2.1
1	A	524	LYS	2.1
1	B	68	ASP	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 ⓘ

There are no carbohydrates in this entry.

6.4 Ligands ⓘ

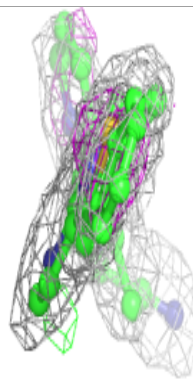
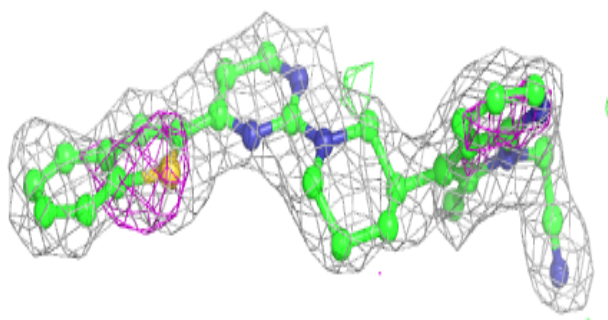
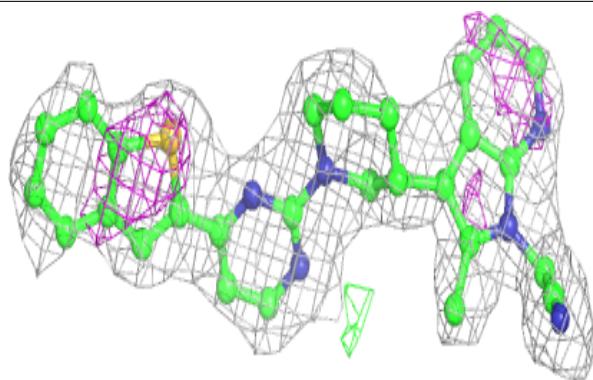
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	EDO	B	582	4/4	0.49	0.30	48,48,49,49	0
3	EDO	B	588	4/4	0.58	0.35	33,35,35,35	0
3	EDO	B	586	4/4	0.63	0.21	44,44,44,44	0
4	GOL	A	583	6/6	0.69	0.26	35,36,38,38	0
3	EDO	A	586	4/4	0.71	0.36	54,54,54,54	0
3	EDO	B	583	4/4	0.72	0.17	45,45,45,46	0
3	EDO	B	580	4/4	0.73	0.18	40,40,40,40	0
3	EDO	B	585	4/4	0.80	0.46	45,45,45,45	0
3	EDO	A	584	4/4	0.81	0.15	47,48,48,48	0
3	EDO	B	587	4/4	0.82	0.31	60,60,60,60	0
3	EDO	A	580	4/4	0.84	0.21	42,42,42,42	0
3	EDO	A	585	4/4	0.85	0.15	40,40,40,41	0
3	EDO	B	584	4/4	0.85	0.14	41,41,42,42	0
3	EDO	A	581	4/4	0.86	0.12	35,35,35,36	0
2	QK5	B	600	34/34	0.86	0.17	25,28,31,31	0
2	QK5	A	600	34/34	0.88	0.16	27,28,31,31	0
3	EDO	A	582	4/4	0.90	0.11	43,43,43,43	0
3	EDO	B	581	4/4	0.90	0.14	34,34,34,34	0

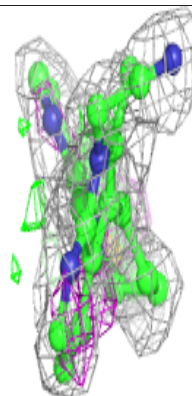
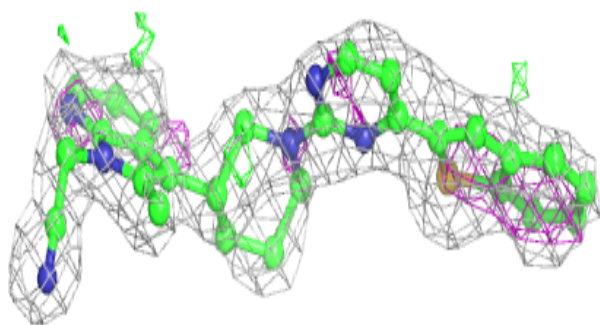
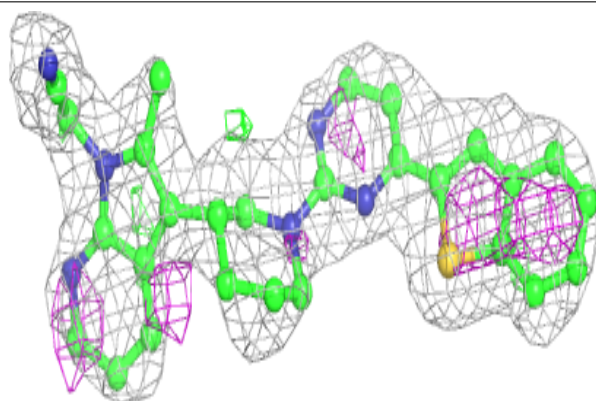
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around QK5 B 600:

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

**Electron density around QK5 A 600:**

$2mF_o-DF_c$ (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.