



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 12, 2026 – 12:07 PM UTC

PDB ID : 3UE8 / pdb_00003ue8
Title : Kynurenine Aminotransferase II Inhibitors
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M.M.; Horner, W.; Kim, J.Y.; McAllister, L.A.; Pandit, J.; Paradis, V.;
Parikh, V.D.; Reese, M.R.; Rong, S.B.; Salafia, M.A.; Schuyten, K.; Strick,
C.A.; Tuttle, J.B.; Valentine, J.; Wang, H.; Zawadzke, L.E.; Verhoest, P.R.
Deposited on : 2011-10-28
Resolution : 3.22 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)

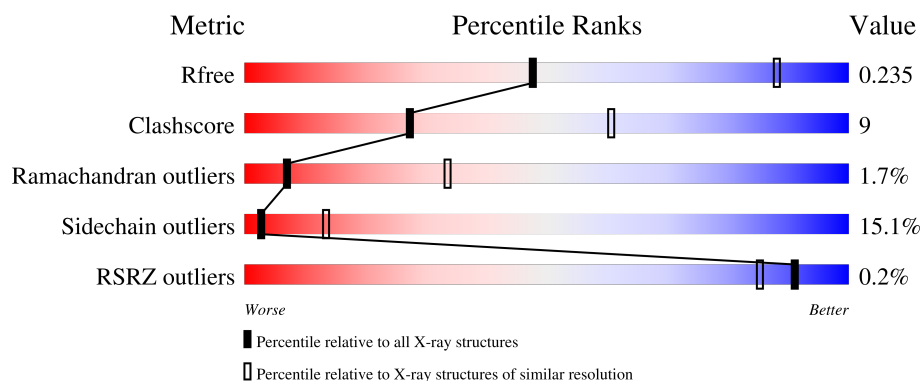
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.22 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	1768 (3.24-3.20)
Clashscore	190562	1879 (3.24-3.20)
Ramachandran outliers	187476	1844 (3.24-3.20)
Sidechain outliers	187428	1843 (3.24-3.20)
RSRZ outliers	180081	1768 (3.24-3.20)

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 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	439	
1	B	439	

Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 6485 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 Kynurenine/alpha-aminoadipate aminotransferase, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	410	Total	C	N	O	S	0	0	0
			3188	2052	530	590	16			
1	B	414	Total	C	N	O	S	0	0	0
			3239	2081	541	600	17			

There are 28 discrepancies between the modelled and reference sequences:

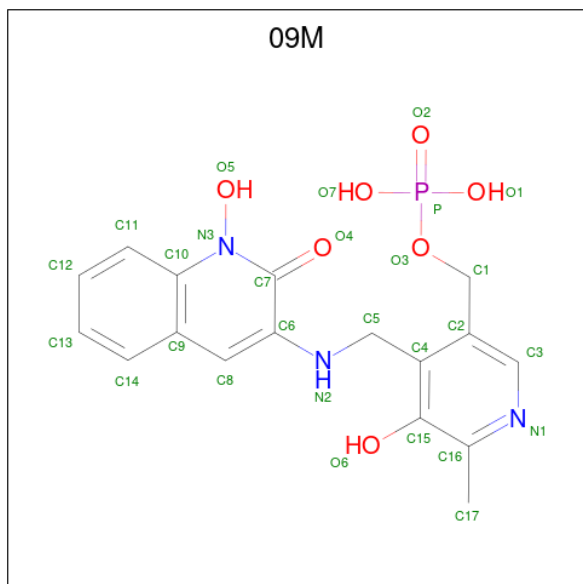
Chain	Residue	Modelled	Actual	Comment	Reference
A	426	LEU	-	expression tag	UNP Q8N5Z0
A	427	VAL	-	expression tag	UNP Q8N5Z0
A	428	PRO	-	expression tag	UNP Q8N5Z0
A	429	ARG	-	expression tag	UNP Q8N5Z0
A	430	GLY	-	expression tag	UNP Q8N5Z0
A	431	SER	-	expression tag	UNP Q8N5Z0
A	432	LEU	-	expression tag	UNP Q8N5Z0
A	433	GLU	-	expression tag	UNP Q8N5Z0
A	434	HIS	-	expression tag	UNP Q8N5Z0
A	435	HIS	-	expression tag	UNP Q8N5Z0
A	436	HIS	-	expression tag	UNP Q8N5Z0
A	437	HIS	-	expression tag	UNP Q8N5Z0
A	438	HIS	-	expression tag	UNP Q8N5Z0
A	439	HIS	-	expression tag	UNP Q8N5Z0
B	426	LEU	-	expression tag	UNP Q8N5Z0
B	427	VAL	-	expression tag	UNP Q8N5Z0
B	428	PRO	-	expression tag	UNP Q8N5Z0
B	429	ARG	-	expression tag	UNP Q8N5Z0
B	430	GLY	-	expression tag	UNP Q8N5Z0
B	431	SER	-	expression tag	UNP Q8N5Z0
B	432	LEU	-	expression tag	UNP Q8N5Z0
B	433	GLU	-	expression tag	UNP Q8N5Z0
B	434	HIS	-	expression tag	UNP Q8N5Z0
B	435	HIS	-	expression tag	UNP Q8N5Z0

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Chain	Residue	Modelled	Actual	Comment	Reference
B	436	HIS	-	expression tag	UNP Q8N5Z0
B	437	HIS	-	expression tag	UNP Q8N5Z0
B	438	HIS	-	expression tag	UNP Q8N5Z0
B	439	HIS	-	expression tag	UNP Q8N5Z0

- Molecule 2 is (5-hydroxy-4-[(1-hydroxy-2-oxo-1,2-dihydroquinolin-3-yl)amino]methyl}-6-methylpyridin-3-yl)methyl dihydrogen phosphate (CCD ID: 09M) (formula: C₁₇H₁₈N₃O₇P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			28	17	3	7	1		
2	B	1	Total	C	N	O	P	0	0
			28	17	3	7	1		

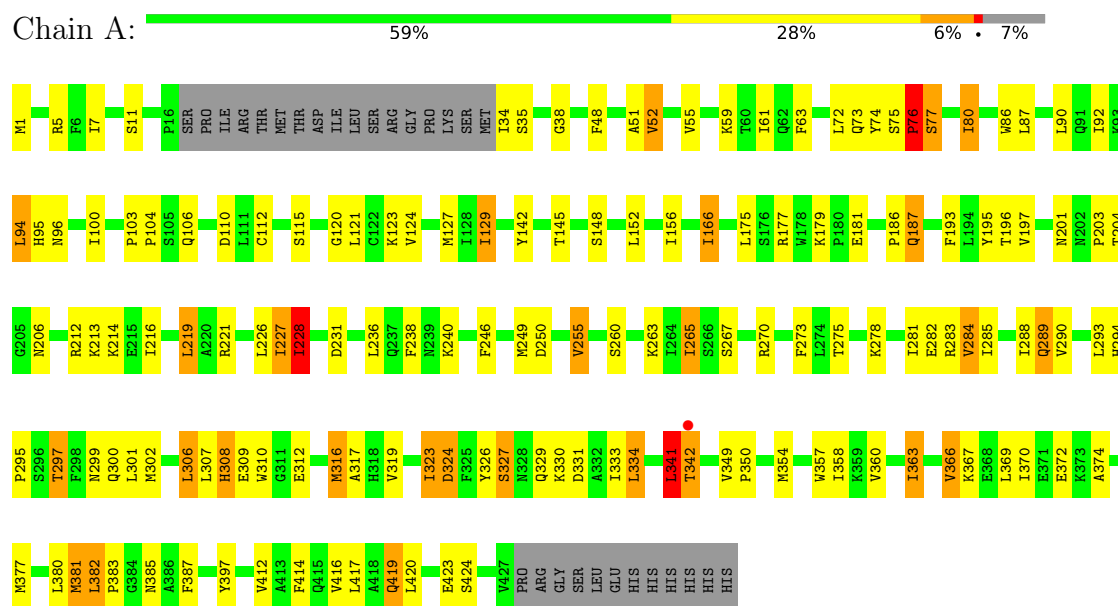
- Molecule 3 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Cl	0	0
			1	1		
3	B	1	Total	Cl	0	0
			1	1		

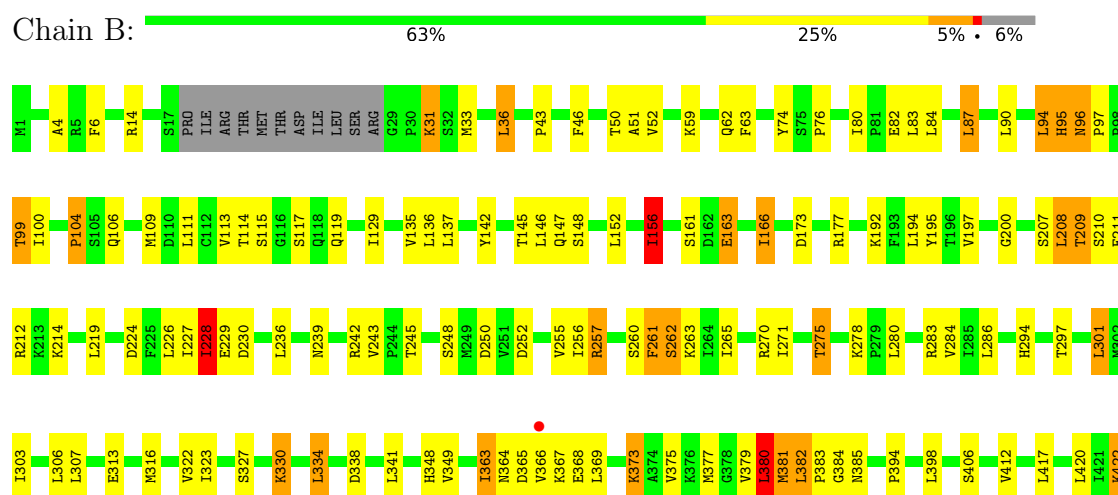
3 Residue-property plots

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: Kynurenine/alpha-aminoadipate aminotransferase, mitochondrial



- Molecule 1: Kynurenine/alpha-aminoadipate aminotransferase, mitochondrial



L425
LEU
VAL
PRO
ARG
GLY
SER
LEU
GLU
HIS
HIS
HIS
HIS
HIS

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	63.62Å 116.60Å 129.27Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.43 – 3.22 30.43 – 3.22	Depositor EDS
% Data completeness (in resolution range)	97.8 (30.43-3.22) 97.6 (30.43-3.22)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	7.07 (at 3.24Å)	Xtriage
Refinement program	BUSTER 2.11.2	Depositor
R, R_{free}	0.200 , 0.275 (Not available) , 0.235	Depositor DCC
R_{free} test set	790 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	56.9	Xtriage
Anisotropy	0.187	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 61.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.53$, $\langle L^2 \rangle = 0.38$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	6485	wwPDB-VP
Average B, all atoms (Å ²)	56.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.30% 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: 09M, CL

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	0.90	1/3267 (0.0%)	1.49	30/4443 (0.7%)
1	B	0.85	1/3319 (0.0%)	1.52	35/4505 (0.8%)
All	All	0.88	2/6586 (0.0%)	1.51	65/8948 (0.7%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	243	VAL	CA-C	6.03	1.58	1.52
1	A	166	ILE	CA-CB	5.58	1.59	1.54

All (65) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	129	ILE	N-CA-C	8.24	120.05	108.93
1	B	382	LEU	N-CA-C	7.92	119.32	109.57
1	B	330	LYS	N-CA-C	-7.03	103.30	110.97
1	A	382	LEU	N-CA-C	6.90	119.51	109.71
1	A	129	ILE	N-CA-C	6.74	118.52	108.54
1	A	238	PHE	CA-C-N	6.64	131.33	120.63
1	A	238	PHE	C-N-CA	6.64	131.33	120.63
1	B	76	PRO	CA-C-N	6.45	129.22	120.38
1	B	76	PRO	C-N-CA	6.45	129.22	120.38
1	A	284	VAL	N-CA-CB	6.42	118.79	110.57
1	B	100	ILE	N-CA-C	6.33	117.01	110.36
1	B	380	LEU	N-CA-C	6.26	119.10	108.90
1	B	36	LEU	N-CA-C	-6.19	104.36	112.41
1	B	373	LYS	N-CA-C	6.19	118.53	111.11
1	A	273	PHE	N-CA-C	6.17	118.75	108.13
1	A	206	ASN	CA-CB-CG	6.08	118.68	112.60
1	A	76	PRO	N-CA-C	5.98	124.79	112.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	173	ASP	CA-CB-CG	5.97	118.57	112.60
1	A	324	ASP	CA-CB-CG	5.95	118.55	112.60
1	A	341	LEU	CA-C-N	5.92	132.84	121.54
1	A	341	LEU	C-N-CA	5.92	132.84	121.54
1	A	104	PRO	CA-C-N	5.81	128.86	120.38
1	A	104	PRO	C-N-CA	5.81	128.86	120.38
1	A	255	VAL	N-CA-C	5.77	116.25	108.17
1	A	231	ASP	N-CA-C	5.71	119.36	108.97
1	A	35	SER	N-CA-C	5.67	117.64	108.34
1	A	228	ILE	CB-CA-C	5.59	119.14	111.31
1	A	331	ASP	CA-CB-CG	5.59	118.19	112.60
1	B	381	MET	CA-C-N	5.57	128.79	120.83
1	B	381	MET	C-N-CA	5.57	128.79	120.83
1	A	317	ALA	N-CA-C	-5.57	104.90	110.97
1	B	383	PRO	CA-C-N	5.48	126.18	119.99
1	B	383	PRO	C-N-CA	5.48	126.18	119.99
1	B	261	PHE	CA-C-N	5.47	128.37	120.38
1	B	261	PHE	C-N-CA	5.47	128.37	120.38
1	B	4	ALA	CA-C-N	5.47	128.36	120.38
1	B	4	ALA	C-N-CA	5.47	128.36	120.38
1	B	341	LEU	N-CA-C	5.46	119.67	112.89
1	B	96	ASN	CA-CB-CG	5.45	118.05	112.60
1	B	228	ILE	CB-CA-C	5.45	118.61	111.53
1	A	177	ARG	N-CA-C	-5.41	105.46	111.36
1	A	250	ASP	N-CA-C	5.40	117.97	109.39
1	A	397	TYR	N-CA-C	5.40	118.86	110.17
1	B	59	LYS	CA-C-N	5.40	128.77	121.05
1	B	59	LYS	C-N-CA	5.40	128.77	121.05
1	A	281	ILE	CA-C-N	5.34	127.98	120.28
1	A	281	ILE	C-N-CA	5.34	127.98	120.28
1	B	146	LEU	N-CA-C	-5.33	105.56	111.36
1	A	227	ILE	N-CA-CB	5.31	118.59	111.90
1	A	358	ILE	N-CA-C	5.29	115.93	108.36
1	A	265	ILE	CB-CA-C	5.26	116.44	111.44
1	B	384	GLY	N-CA-C	5.26	119.00	112.64
1	B	100	ILE	N-CA-CB	5.24	116.33	110.51
1	A	385	ASN	CA-C-N	5.23	129.05	120.63
1	A	385	ASN	C-N-CA	5.23	129.05	120.63
1	B	156	ILE	N-CA-C	5.20	114.78	106.88
1	B	322	VAL	N-CA-CB	5.16	118.32	110.58
1	B	99	THR	CB-CA-C	5.13	120.63	110.17
1	B	104	PRO	CA-C-N	5.10	128.46	120.82

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	104	PRO	C-N-CA	5.10	128.46	120.82
1	B	239	ASN	CA-C-N	5.09	127.35	120.38
1	B	239	ASN	C-N-CA	5.09	127.35	120.38
1	B	306	LEU	CA-C-N	5.02	127.01	120.28
1	B	306	LEU	C-N-CA	5.02	127.01	120.28
1	A	309	GLU	CB-CG-CD	5.02	121.13	112.60

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	3188	0	3169	68	0
1	B	3239	0	3243	56	0
2	A	28	0	17	6	0
2	B	28	0	18	2	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
All	All	6485	0	6447	118	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 9.

All (118) 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:214:LYS:HA	1:A:249:MET:HE1	1.50	0.90
1:A:129:ILE:HD11	1:A:193:PHE:HE1	1.39	0.87
1:A:142:TYR:HD1	1:A:145:THR:HG23	1.40	0.87
1:A:73:GLN:O	1:A:297:THR:HG21	1.81	0.80
1:B:256:ILE:HD11	1:B:280:LEU:HD23	1.67	0.75
1:A:145:THR:HG21	1:A:195:TYR:OH	1.89	0.72
1:A:129:ILE:HD11	1:A:193:PHE:CE1	2.24	0.71
1:B:104:PRO:HB3	1:B:278:LYS:HD3	1.75	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:52:VAL:HG13	1:B:52:VAL:HG13	1.76	0.68
1:A:333:ILE:HG13	1:A:414:PHE:HE1	1.61	0.65
1:A:142:TYR:CD1	1:A:145:THR:HG23	2.28	0.65
1:B:6:PHE:HA	1:B:192:LYS:HE3	1.79	0.64
1:A:34:ILE:HB	1:B:379:VAL:HG12	1.78	0.64
2:A:440:09M:H4	1:B:74:TYR:HH	1.44	0.64
1:B:95:HIS:HB2	1:B:248:SER:HB3	1.80	0.64
1:A:319:VAL:O	1:A:323:ILE:HG13	1.98	0.64
2:A:440:09M:O7	1:B:74:TYR:OH	2.12	0.63
1:B:381:MET:HE2	1:B:398:LEU:HD13	1.80	0.62
1:A:197:VAL:HB	1:A:201:ASN:HD22	1.64	0.61
1:B:163:GLU:HG2	1:B:348:HIS:CE1	2.35	0.61
1:B:242:ARG:HH12	1:B:316:MET:HE1	1.66	0.60
1:B:135:VAL:HG23	1:B:156:ILE:HG23	1.82	0.60
1:B:375:VAL:HA	1:B:380:LEU:HD11	1.82	0.60
1:B:142:TYR:O	1:B:145:THR:HG22	2.02	0.60
1:B:242:ARG:NH1	1:B:316:MET:HE1	2.17	0.59
1:B:422:LYS:HA	1:B:425:LEU:HD12	1.84	0.59
1:B:51:ALA:HB3	1:B:63:PHE:HB2	1.84	0.59
1:A:120:GLY:O	1:A:124:VAL:HG23	2.03	0.58
1:A:75:SER:HB3	1:A:297:THR:HB	1.86	0.58
1:A:80:ILE:HG12	1:A:300:GLN:HB3	1.87	0.57
1:B:84:LEU:HD13	1:B:113:VAL:HG23	1.87	0.57
1:B:363:ILE:HG22	1:B:365:ASP:H	1.69	0.56
1:A:316:MET:HA	1:A:319:VAL:HG22	1.88	0.56
1:B:271:ILE:HG13	1:B:303:ILE:HD13	1.89	0.55
1:B:334:LEU:HD21	1:B:349:VAL:HG23	1.89	0.54
1:B:195:TYR:HD1	1:B:228:ILE:HD11	1.72	0.54
1:B:260:SER:OG	1:B:262:SER:HB2	2.08	0.54
1:A:270:ARG:HD3	1:B:294:HIS:CE1	2.43	0.54
1:A:115:SER:HA	1:A:270:ARG:O	2.08	0.54
1:A:186:PRO:O	1:A:187:GLN:HB2	2.07	0.54
1:B:87:LEU:HD11	1:B:261:PHE:HZ	1.73	0.53
1:A:48:PHE:HB2	1:A:72:LEU:HD11	1.89	0.53
1:A:263:LYS:NZ	2:A:440:09M:H14	2.24	0.53
1:B:63:PHE:CZ	1:B:301:LEU:HB3	2.44	0.52
1:A:175:LEU:HD12	1:A:219:LEU:HD22	1.92	0.51
1:A:227:ILE:HB	1:A:255:VAL:HG22	1.93	0.51
1:B:365:ASP:HB2	1:B:394:PRO:HB3	1.93	0.51
1:B:227:ILE:HB	1:B:255:VAL:HG22	1.93	0.51
1:A:103:PRO:HD2	1:A:106:GLN:HB2	1.93	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:330:LYS:HG3	1:A:350:PRO:HG2	1.93	0.50
1:A:377:MET:HE3	1:A:416:VAL:HG13	1.94	0.50
1:B:377:MET:HE3	1:B:420:LEU:HD21	1.93	0.49
1:A:92:ILE:HG12	1:A:100:ILE:HD12	1.93	0.49
1:A:260:SER:OG	2:A:440:09M:O2	2.22	0.49
1:A:121:LEU:HD23	1:A:228:ILE:HD11	1.93	0.49
1:B:263:LYS:NZ	2:B:440:09M:H14	2.28	0.49
1:A:263:LYS:HG3	1:A:354:MET:HE3	1.94	0.49
1:B:90:LEU:HG	1:B:94:LEU:HD12	1.94	0.49
1:B:245:THR:O	1:B:248:SER:OG	2.29	0.49
1:A:294:HIS:HD2	1:A:295:PRO:O	1.96	0.49
1:B:261:PHE:HB3	1:B:265:ILE:HB	1.96	0.48
1:B:115:SER:HA	1:B:270:ARG:O	2.13	0.48
1:A:360:VAL:HG21	1:A:366:VAL:HG21	1.94	0.48
1:B:111:LEU:HG	1:B:275:THR:HG23	1.96	0.48
1:A:55:VAL:HG21	1:A:306:LEU:HD13	1.95	0.48
1:A:334:LEU:HD21	1:A:349:VAL:HG13	1.96	0.48
1:A:381:MET:HB3	1:B:36:LEU:HB2	1.96	0.48
1:B:209:THR:OG1	1:B:212:ARG:HG2	2.14	0.48
1:A:333:ILE:HG13	1:A:414:PHE:CE1	2.46	0.47
1:A:75:SER:HB2	1:A:76:PRO:HD2	1.95	0.47
1:A:363:ILE:HD11	1:A:424:SER:HB2	1.95	0.47
1:B:200:GLY:H	1:B:207:SER:HB2	1.78	0.47
1:A:110:ASP:HB2	1:A:278:LYS:HA	1.96	0.47
1:A:212:ARG:O	1:A:216:ILE:HG13	2.14	0.47
1:B:166:ILE:HG23	1:B:208:LEU:HD11	1.95	0.47
1:B:43:PRO:HA	1:B:46:PHE:CD1	2.50	0.47
1:A:289:GLN:O	1:A:293:LEU:HD23	2.15	0.46
1:B:373:LYS:HB3	1:B:420:LEU:HD13	1.98	0.46
1:A:412:VAL:O	1:A:416:VAL:HG23	2.16	0.46
1:A:341:LEU:HD21	1:A:414:PHE:CD2	2.51	0.46
1:B:163:GLU:CG	1:B:348:HIS:CE1	2.98	0.46
1:A:370:ILE:HA	1:A:374:ALA:HB3	1.98	0.45
1:A:34:ILE:O	1:B:379:VAL:HA	2.16	0.45
1:B:97:PRO:HG2	1:B:109:MET:SD	2.56	0.45
1:A:377:MET:HE2	1:A:420:LEU:HD21	1.99	0.45
1:A:267:SER:HB2	1:B:74:TYR:CZ	2.51	0.45
1:A:90:LEU:O	1:A:94:LEU:HB2	2.17	0.45
1:A:326:TYR:HA	1:A:329:GLN:HB2	1.99	0.44
1:A:416:VAL:O	1:A:419:GLN:HB2	2.17	0.44
1:B:271:ILE:HG13	1:B:303:ILE:CD1	2.47	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:440:09M:H13	2:A:440:09M:H3	1.73	0.44
1:B:260:SER:HG	2:B:440:09M:H5	1.58	0.43
1:A:95:HIS:O	1:A:96:ASN:C	2.61	0.43
1:A:74:TYR:HD1	1:A:294:HIS:HE1	1.66	0.43
1:A:299:ASN:HA	1:A:302:MET:HB2	2.00	0.43
1:B:229:GLU:HB3	1:B:257:ARG:HB2	2.00	0.43
1:A:203:PRO:HG3	1:A:387:PHE:CG	2.53	0.43
2:A:440:09M:H13	2:A:440:09M:H7	1.83	0.43
1:A:112:CYS:SG	1:A:285:ILE:HG12	2.58	0.43
1:B:31:LYS:C	1:B:33:MET:H	2.26	0.43
1:A:51:ALA:HB3	1:A:63:PHE:HB2	2.01	0.42
1:B:211:GLU:O	1:B:214:LYS:HB2	2.20	0.42
1:B:210:SER:O	1:B:214:LYS:HG3	2.19	0.42
1:A:213:LYS:HA	1:A:216:ILE:HD12	2.01	0.42
1:B:363:ILE:HG22	1:B:364:ASN:H	1.85	0.42
1:A:370:ILE:HG21	1:A:383:PRO:HG3	2.02	0.42
1:A:121:LEU:CD2	1:A:228:ILE:HD11	2.49	0.41
1:A:204:THR:HA	1:A:357:TRP:CB	2.50	0.41
1:A:290:VAL:HG11	1:B:147:GLN:HB3	2.00	0.41
1:A:246:PHE:HA	1:A:249:MET:HG2	2.03	0.41
1:A:186:PRO:O	1:A:187:GLN:CB	2.69	0.41
1:A:290:VAL:CG1	1:B:147:GLN:HB3	2.50	0.41
1:A:77:SER:HA	1:A:294:HIS:HB3	2.02	0.41
1:B:197:VAL:HA	1:B:230:ASP:O	2.21	0.41
1:A:73:GLN:HG3	1:A:74:TYR:N	2.36	0.40
1:A:86:TRP:HB2	1:A:308:HIS:CE1	2.56	0.40
1:A:324:ASP:HA	1:A:327:SER:HB2	2.04	0.40
1:B:114:THR:HB	1:B:119:GLN:HB3	2.03	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	406/439 (92%)	370 (91%)	28 (7%)	8 (2%)	6	30
1	B	410/439 (93%)	358 (87%)	46 (11%)	6 (2%)	8	36
All	All	816/878 (93%)	728 (89%)	74 (9%)	14 (2%)	7	33

All (14) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	77	SER
1	A	187	GLN
1	A	342	THR
1	B	250	ASP
1	A	240	LYS
1	B	14	ARG
1	B	224	ASP
1	B	106	GLN
1	A	76	PRO
1	A	59	LYS
1	B	152	LEU
1	A	369	LEU
1	A	38	GLY
1	B	96	ASN

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	349/383 (91%)	296 (85%)	53 (15%)	3	13
1	B	358/383 (94%)	304 (85%)	54 (15%)	3	13
All	All	707/766 (92%)	600 (85%)	107 (15%)	3	13

All (107) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	5	ARG

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Mol	Chain	Res	Type
1	A	7	ILE
1	A	11	SER
1	A	52	VAL
1	A	61	ILE
1	A	80	ILE
1	A	87	LEU
1	A	94	LEU
1	A	123	LYS
1	A	127	MET
1	A	148	SER
1	A	152	LEU
1	A	156	ILE
1	A	166	ILE
1	A	179	LYS
1	A	181	GLU
1	A	196	THR
1	A	219	LEU
1	A	221	ARG
1	A	226	LEU
1	A	228	ILE
1	A	236	LEU
1	A	265	ILE
1	A	275	THR
1	A	282	GLU
1	A	283	ARG
1	A	284	VAL
1	A	288	ILE
1	A	289	GLN
1	A	297	THR
1	A	301	LEU
1	A	306	LEU
1	A	307	LEU
1	A	308	HIS
1	A	310	TRP
1	A	312	GLU
1	A	316	MET
1	A	323	ILE
1	A	327	SER
1	A	334	LEU
1	A	341	LEU
1	A	342	THR
1	A	363	ILE

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Mol	Chain	Res	Type
1	A	366	VAL
1	A	367	LYS
1	A	372	GLU
1	A	380	LEU
1	A	381	MET
1	A	382	LEU
1	A	417	LEU
1	A	419	GLN
1	A	423	GLU
1	B	31	LYS
1	B	50	THR
1	B	62	GLN
1	B	80	ILE
1	B	82	GLU
1	B	83	LEU
1	B	87	LEU
1	B	94	LEU
1	B	95	HIS
1	B	99	THR
1	B	117	SER
1	B	136	LEU
1	B	137	LEU
1	B	148	SER
1	B	156	ILE
1	B	161	SER
1	B	163	GLU
1	B	166	ILE
1	B	177	ARG
1	B	194	LEU
1	B	208	LEU
1	B	209	THR
1	B	219	LEU
1	B	226	LEU
1	B	228	ILE
1	B	236	LEU
1	B	252	ASP
1	B	257	ARG
1	B	262	SER
1	B	275	THR
1	B	283	ARG
1	B	284	VAL
1	B	286	LEU

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Mol	Chain	Res	Type
1	B	297	THR
1	B	301	LEU
1	B	307	LEU
1	B	313	GLU
1	B	323	ILE
1	B	327	SER
1	B	330	LYS
1	B	334	LEU
1	B	338	ASP
1	B	363	ILE
1	B	366	VAL
1	B	367	LYS
1	B	368	GLU
1	B	369	LEU
1	B	380	LEU
1	B	382	LEU
1	B	385	ASN
1	B	406	SER
1	B	412	VAL
1	B	417	LEU
1	B	422	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	91	GLN
1	A	106	GLN
1	A	201	ASN
1	A	237	GLN
1	A	294	HIS
1	A	299	ASN
1	A	308	HIS
1	A	409	GLN
1	A	415	GLN
1	A	419	GLN
1	B	44	ASN
1	B	147	GLN
1	B	187	GLN
1	B	199	ASN
1	B	201	ASN
1	B	237	GLN
1	B	294	HIS

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Mol	Chain	Res	Type
1	B	299	ASN
1	B	305	GLN
1	B	348	HIS

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 4 ligands modelled in this entry, 2 are monoatomic - leaving 2 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	$\# Z > 2$
2	09M	A	440	-	30,30,30	1.72	5 (16%)	41,44,44	1.52	4 (9%)
2	09M	B	440	-	30,30,30	1.38	2 (6%)	41,44,44	1.58	5 (12%)

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	09M	A	440	-	-	2/11/11/11	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	09M	B	440	-	-	5/11/11/11	0/3/3/3

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	440	09M	C8-C6	5.83	1.39	1.35
2	A	440	09M	C8-C6	-4.88	1.31	1.35
2	A	440	09M	C10-N3	-4.35	1.34	1.40
2	B	440	09M	C10-N3	4.13	1.45	1.40
2	A	440	09M	C7-N3	-3.70	1.32	1.38
2	A	440	09M	O3-C1	-3.55	1.31	1.44
2	A	440	09M	C6-C7	-2.21	1.42	1.48

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	440	09M	C5-N2-C6	6.45	134.81	123.44
2	A	440	09M	C7-C6-N2	5.24	120.72	112.81
2	A	440	09M	O3-C1-C2	-5.20	99.61	109.36
2	B	440	09M	C9-C8-C6	4.31	122.51	120.23
2	B	440	09M	C7-C6-N2	3.40	117.95	112.81
2	A	440	09M	C8-C6-N2	-3.36	119.53	124.89
2	B	440	09M	C10-N3-C7	-3.13	124.14	126.68
2	A	440	09M	C9-C8-C6	2.49	121.55	120.23
2	B	440	09M	C5-C4-C2	2.26	122.21	119.75

There are no chirality outliers.

All (7) torsion outliers are listed below:

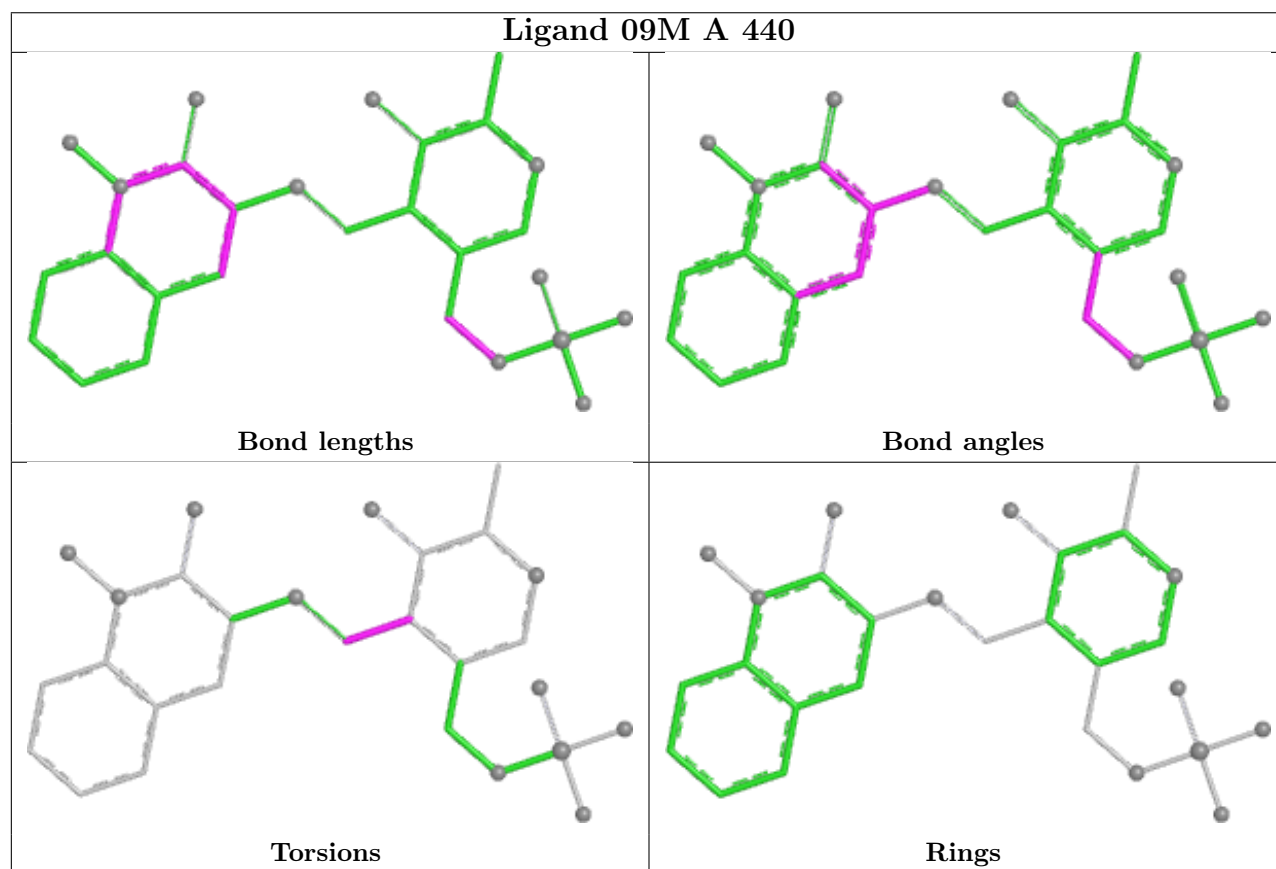
Mol	Chain	Res	Type	Atoms
2	B	440	09M	C1-O3-P-O7
2	B	440	09M	C1-O3-P-O1
2	B	440	09M	C1-O3-P-O2
2	A	440	09M	C2-C4-C5-N2
2	B	440	09M	C2-C4-C5-N2
2	A	440	09M	C15-C4-C5-N2
2	B	440	09M	C15-C4-C5-N2

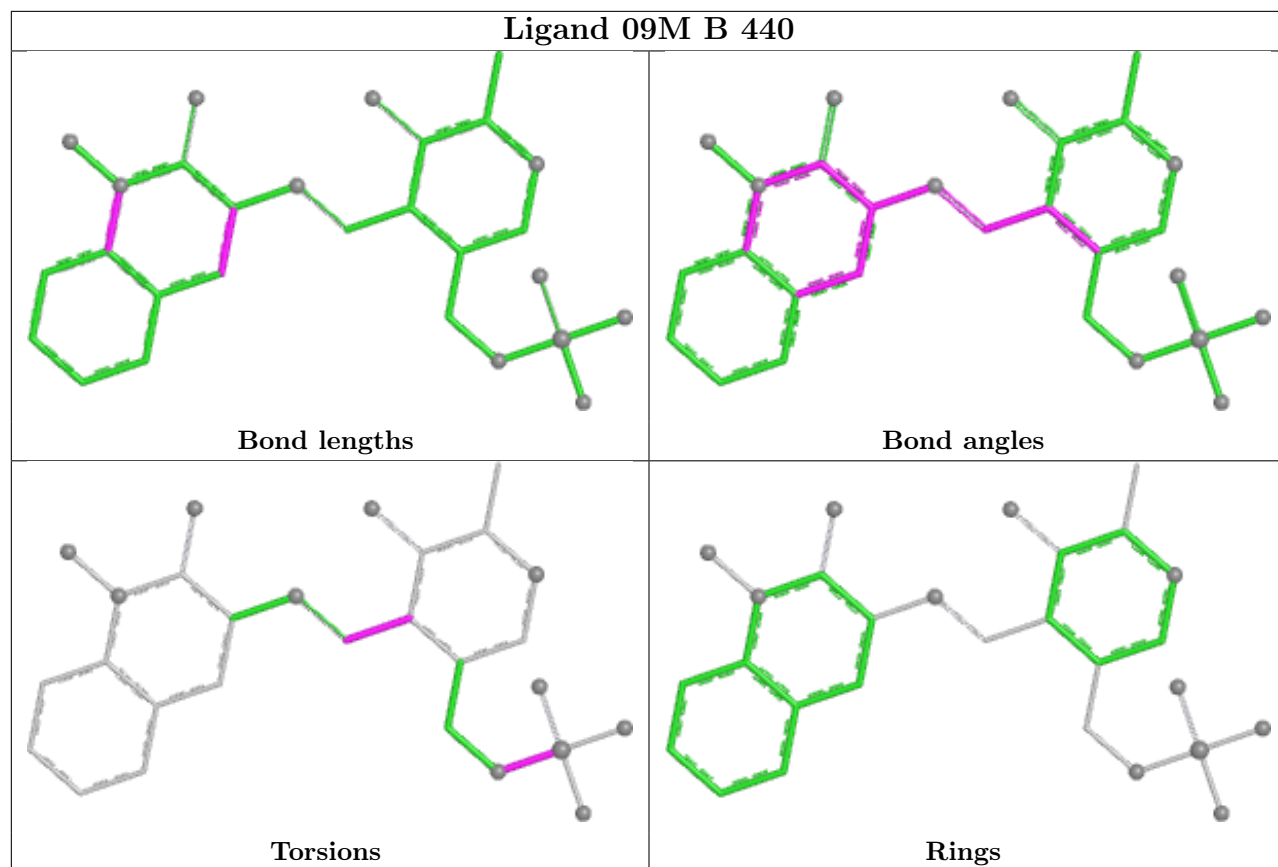
There are no ring outliers.

2 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	440	09M	6	0
2	B	440	09M	2	0

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





5.7 Other polymers [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	410/439 (93%)	-0.40	1 (0%) 91 85	23, 47, 77, 97	0
1	B	414/439 (94%)	-0.19	1 (0%) 91 85	29, 58, 110, 145	0
All	All	824/878 (93%)	-0.30	2 (0%) 91 85	23, 52, 93, 145	0

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	366	VAL	2.6
1	A	342	THR	2.3

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(Å ²)	Q<0.9
3	CL	B	441	1/1	0.81	0.11	60,60,60,60	0
2	09M	A	440	28/28	0.93	0.09	35,43,58,62	0
3	CL	A	441	1/1	0.94	0.13	35,35,35,35	0

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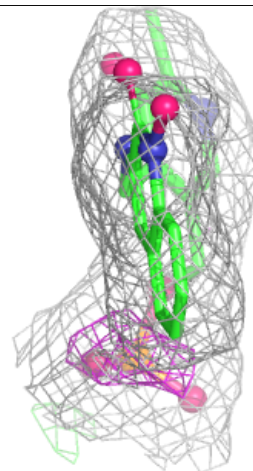
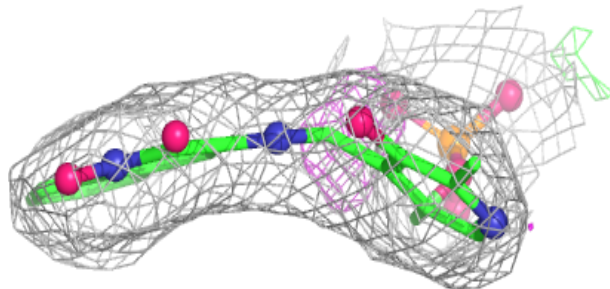
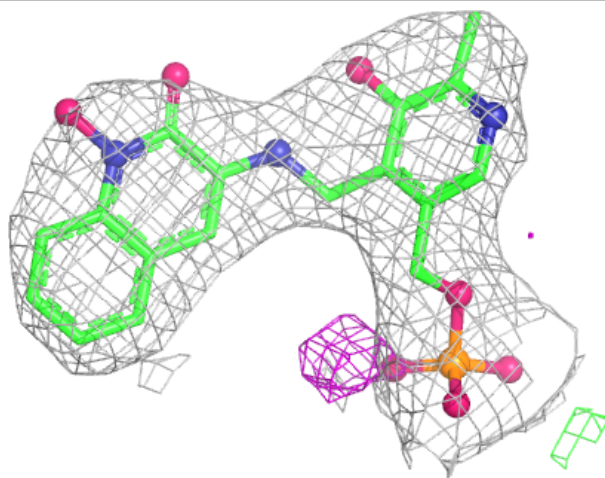
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	09M	B	440	28/28	0.95	0.09	40,53,77,78	0

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.

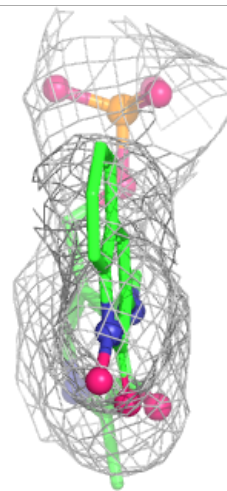
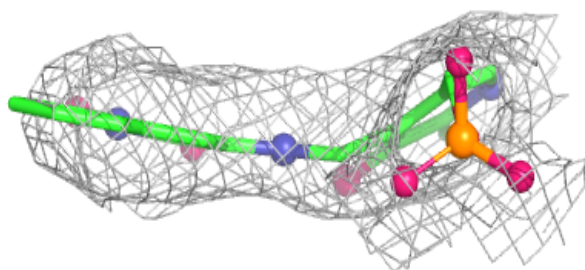
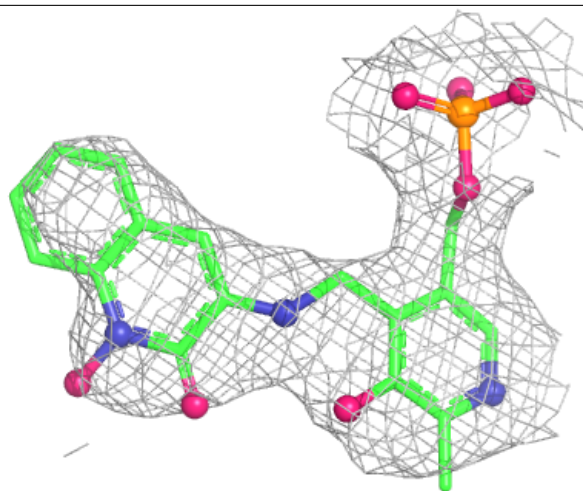
Electron density around 09M A 440:

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 09M B 440:

$2mF_o-DF_c$ (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.