



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 07:54 AM UTC

PDB ID : 2XAE / pdb_00002xae
Title : Crystal structure of human kinesin Eg5 in complex with (R)-2-amino-3-((S)-2-methyl-1,1-diphenylbutylthio)propanoic acid
Authors : Kaan, H.Y.K.; Weiss, J.; Menger, D.; Ulaganathan, V.; Tkocz, K.; Laggner, C.; Popowycz, F.; Joseph, B.; Kozielski, F.
Deposited on : 2010-03-31
Resolution : 2.60 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

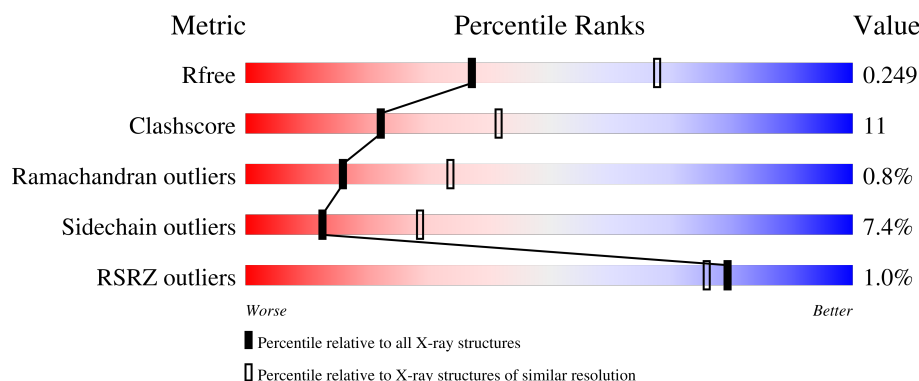
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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	4008 (2.60-2.60)
Clashscore	190562	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)
RSRZ outliers	180081	4008 (2.60-2.60)

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	368	<div> <div>2%</div> <div>67% 20% 11%</div> </div>
1	B	368	<div> <div>2%</div> <div>70% 17% 11%</div> </div>
1	C	368	<div> <div>2%</div> <div>60% 24% 5% 11%</div> </div>

2 Entry composition [i](#)

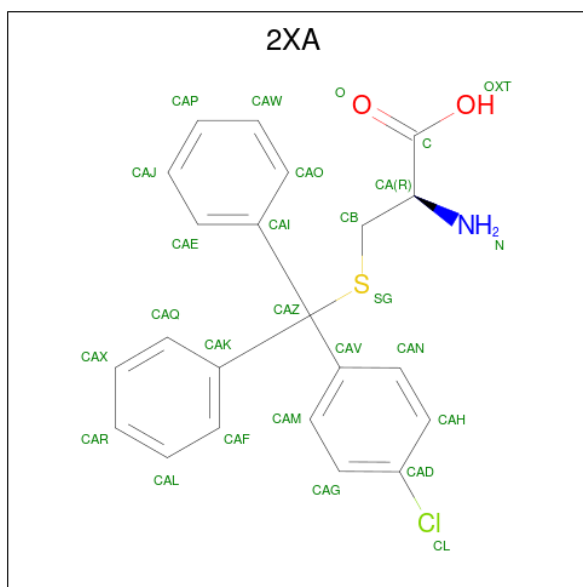
There are 7 unique types of molecules in this entry. The entry contains 8313 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 KINESIN-LIKE PROTEIN KIF11.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	328	Total	C	N	O	S	0	6	0
			2584	1626	452	494	12			
1	B	328	Total	C	N	O	S	0	7	0
			2604	1639	453	501	11			
1	C	329	Total	C	N	O	S	0	2	0
			2578	1618	444	506	10			

- Molecule 2 is (2R)-2-AMINO-3-[(4-CHLOROPHENYL)-DIPHENYL-METHYL]SULFANY L-PROPANOIC ACID (CCD ID: 2XA) (formula: C₂₂H₂₀ClNO₂S).

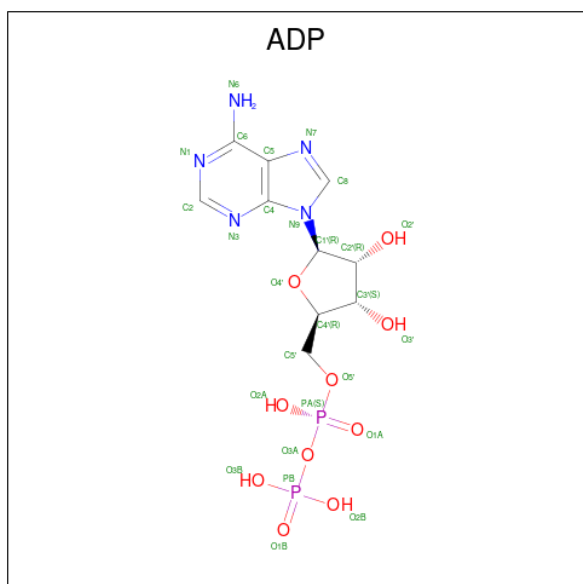


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	Cl	N	O	0	0
			27	22	1	1	2		
2	B	1	Total	C	Cl	N	O	0	0
			27	22	1	1	2		
2	C	1	Total	C	Cl	N	O	0	0
			27	22	1	1	2		

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

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

- Molecule 4 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: C₁₀H₁₅N₅O₁₀P₂).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
4	B	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
4	C	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

- Molecule 5 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Cl	0	0
			1	1		

- Molecule 6 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	B	1	Total	O	S	0	0
			5	4	1		
6	B	1	Total	O	S	0	0
			5	4	1		
6	C	1	Total	O	S	0	0
			5	4	1		

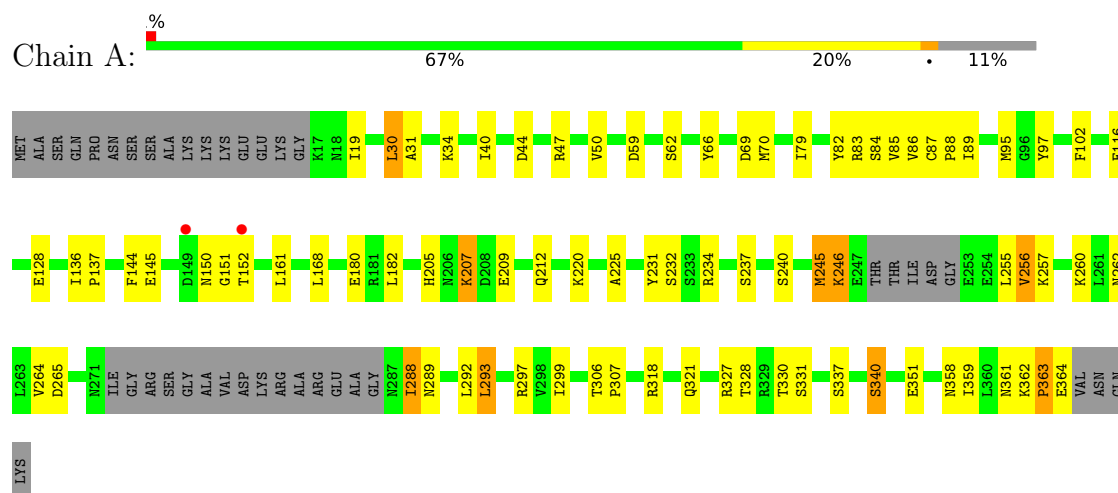
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	129	Total	O	0	0
			129	129		
7	B	156	Total	O	0	0
			156	156		
7	C	81	Total	O	0	0
			81	81		

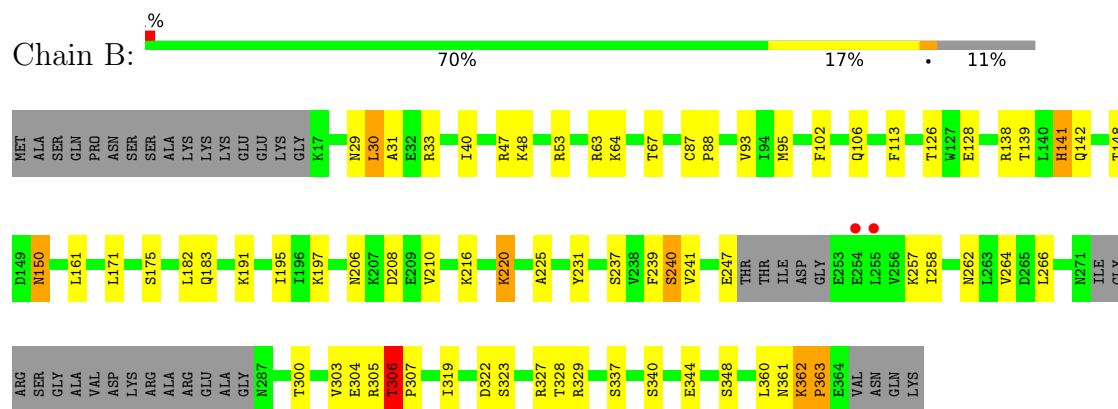
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

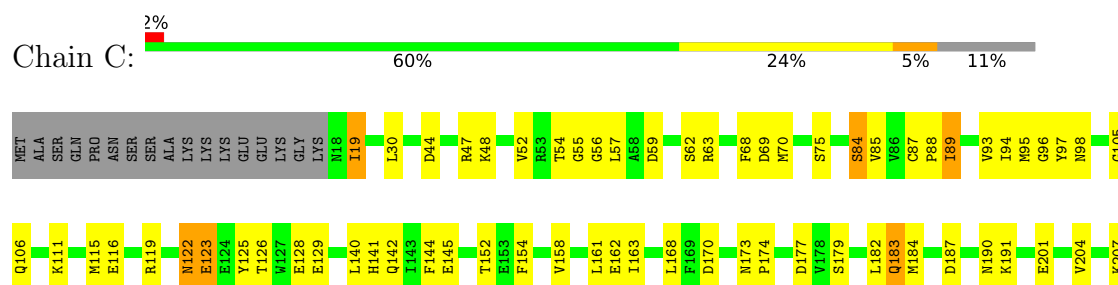
• Molecule 1: KINESIN-LIKE PROTEIN KIF11

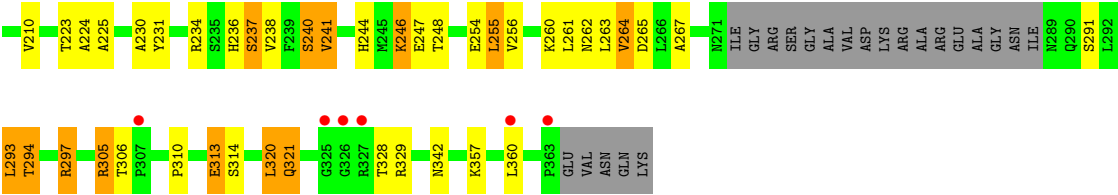


• Molecule 1: KINESIN-LIKE PROTEIN KIF11



• Molecule 1: KINESIN-LIKE PROTEIN KIF11





4 Data and refinement statistics

Property	Value	Source
Space group	P 32	Depositor
Cell constants a, b, c, α , β , γ	96.77 Å 96.77 Å 124.75 Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	30.00 – 2.60 30.00 – 2.60	Depositor EDS
% Data completeness (in resolution range)	100.0 (30.00-2.60) 99.9 (30.00-2.60)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.05 (at 2.61 Å)	Xtriage
Refinement program	REFMAC 5.5.0102	Depositor
R, R_{free}	0.181 , 0.257 0.177 , 0.249	Depositor DCC
R_{free} test set	2013 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	42.7	Xtriage
Anisotropy	0.089	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 41.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.009 for -h,-k,l 0.034 for h,-h-k,-l 0.018 for -k,-h,-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	8313	wwPDB-VP
Average B, all atoms (Å ²)	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.36% 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: 2XA, SO4, CL, MG, ADP

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	0.80	0/2640	1.18	6/3569 (0.2%)
1	B	0.80	0/2665	1.16	8/3603 (0.2%)
1	C	0.72	0/2620	1.15	11/3546 (0.3%)
All	All	0.78	0/7925	1.17	25/10718 (0.2%)

There are no bond length outliers.

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	151	GLY	N-CA-C	6.94	124.56	115.40
1	B	362	LYS	CA-C-N	6.89	127.28	119.83
1	B	362	LYS	C-N-CA	6.89	127.28	119.83
1	C	210	VAL	N-CA-C	6.77	116.86	110.30
1	B	363	PRO	N-CA-C	6.54	121.11	111.03
1	C	84	SER	CA-C-N	-6.43	116.42	122.66
1	C	84	SER	C-N-CA	-6.43	116.42	122.66
1	A	50	VAL	CB-CA-C	-6.34	101.07	110.33
1	B	306	THR	CA-C-N	6.30	125.52	118.97
1	B	306	THR	C-N-CA	6.30	125.52	118.97
1	A	79	ILE	N-CA-C	6.05	116.79	110.62
1	A	363	PRO	N-CA-C	5.98	120.62	111.11
1	C	54	THR	CB-CA-C	-5.89	100.51	110.64
1	C	264	VAL	N-CA-C	5.84	116.28	107.75
1	C	320	LEU	N-CA-C	5.76	118.78	111.69
1	A	288	ILE	N-CA-C	5.73	119.12	111.44
1	C	201	GLU	CA-C-N	-5.55	116.30	123.19
1	C	201	GLU	C-N-CA	-5.55	116.30	123.19
1	C	313	GLU	N-CA-C	5.50	118.04	111.71
1	B	210	VAL	N-CA-C	5.48	115.68	110.53
1	B	139	THR	N-CA-C	-5.21	105.68	111.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	54	THR	N-CA-C	5.20	120.27	112.94
1	B	93	VAL	N-CA-C	-5.16	105.51	110.72
1	C	52	VAL	N-CA-C	5.12	115.22	107.75
1	A	358	ASN	N-CA-C	5.06	119.08	113.01

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	2584	0	2618	52	0
1	B	2604	0	2635	35	0
1	C	2578	0	2585	74	0
2	A	27	0	19	3	0
2	B	27	0	19	3	0
2	C	27	0	19	2	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
4	A	27	0	12	1	0
4	B	27	0	12	2	0
4	C	27	0	12	0	0
5	A	1	0	0	1	0
6	B	10	0	0	0	0
6	C	5	0	0	0	0
7	A	129	0	0	10	0
7	B	156	0	0	5	0
7	C	81	0	0	5	0
All	All	8313	0	7931	168	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 11.

All (168) 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:83:ARG:HD2	7:A:2029:HOH:O	1.74	0.86
5:A:1368:CL:CL	7:A:2128:HOH:O	2.34	0.81
1:B:327:ARG:O	1:B:363:PRO:HA	1.83	0.79
1:C:141:HIS:HD2	1:C:142:GLN:HE21	1.31	0.76
1:A:30:LEU:HD13	1:A:31:ALA:N	2.01	0.75
1:A:234:ARG:NH1	1:A:289:ASN:OD1	2.21	0.74
1:A:87[B]:CYS:HB3	1:A:88:PRO:HD3	1.70	0.73
1:A:30:LEU:HD13	1:A:31:ALA:H	1.53	0.72
1:C:310:PRO:HB2	1:C:313:GLU:HG3	1.72	0.71
1:C:244:HIS:HD2	7:C:2053:HOH:O	1.72	0.70
1:C:98:ASN:ND2	1:C:260:LYS:HB3	2.07	0.69
4:B:1367:ADP:O3B	7:B:2155:HOH:O	2.12	0.66
1:B:87[B]:CYS:HB3	1:B:88:PRO:HD3	1.78	0.65
1:A:328:THR:O	1:A:361:ASN:ND2	2.26	0.65
1:C:246:LYS:HE2	1:C:254:GLU:HG2	1.77	0.65
1:B:141[A]:HIS:HD2	1:B:142:GLN:N	1.97	0.63
1:B:40:ILE:HD13	1:B:340:SER:HA	1.80	0.63
1:C:294:THR:HG21	1:C:314:SER:HB3	1.80	0.63
1:C:183:GLN:HE21	1:C:184:MET:H	1.48	0.61
1:A:299:ILE:HG23	1:A:359:ILE:HD11	1.83	0.61
1:C:85:VAL:O	1:C:89:ILE:HD13	2.00	0.61
1:B:30:LEU:HD13	7:B:2007:HOH:O	2.00	0.60
1:A:144:PHE:O	1:A:145:GLU:C	2.41	0.60
1:A:168:LEU:HB2	1:A:182:LEU:HB2	1.83	0.59
1:C:246:LYS:HZ1	1:C:255:LEU:C	2.09	0.59
1:A:293:LEU:CD2	1:A:297[A]:ARG:CZ	2.80	0.59
1:A:321:GLN:NE2	7:A:2102:HOH:O	2.36	0.59
1:B:183:GLN:HG3	7:B:2040:HOH:O	2.01	0.59
1:A:318:ARG:NH1	7:A:2100:HOH:O	2.33	0.58
1:A:66:TYR:OH	1:A:351:GLU:OE2	2.21	0.58
1:B:161:LEU:C	1:B:161:LEU:HD12	2.29	0.58
1:A:34:LYS:HD2	1:A:34:LYS:C	2.29	0.57
1:C:105:GLY:O	1:C:111:LYS:HE3	2.04	0.57
1:B:47:ARG:O	1:B:48[A]:LYS:HG2	2.04	0.57
1:C:87:CYS:HB2	1:C:88:PRO:HD3	1.86	0.57
1:C:125:TYR:HB3	1:C:129:GLU:HB3	1.85	0.57
1:B:126:THR:HB	1:B:128:GLU:OE2	2.05	0.56
1:A:85:VAL:O	1:A:89:ILE:HD12	2.06	0.56
1:C:141:HIS:HD2	1:C:142:GLN:NE2	2.02	0.56
1:C:230:ALA:HB3	1:C:234:ARG:HD2	1.87	0.56
1:C:115:MET:CE	1:C:263:LEU:HB3	2.35	0.56
1:C:236:HIS:CE1	1:C:267:ALA:H	2.24	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:246:LYS:HZ3	1:C:254:GLU:HB3	1.71	0.55
1:C:158:VAL:HG12	1:C:241:VAL:HG13	1.89	0.55
1:C:116:GLU:HB2	2:C:1364:2XA:CAH	2.37	0.55
2:A:1365:2XA:HAQ	2:A:1365:2XA:CB	2.32	0.55
1:C:69:ASP:O	1:C:70:MET:HG3	2.07	0.55
1:C:122:ASN:O	1:C:123:GLU:C	2.50	0.54
1:C:246:LYS:HE2	1:C:254:GLU:CB	2.37	0.54
2:A:1365:2XA:HAQ	2:A:1365:2XA:HB1C	1.88	0.54
1:B:150:ASN:HD22	1:B:150:ASN:N	2.05	0.54
4:A:1367:ADP:O3B	7:A:2124:HOH:O	2.19	0.54
1:B:141[A]:HIS:CD2	1:B:142:GLN:N	2.75	0.54
1:C:246:LYS:HE2	1:C:254:GLU:HB3	1.90	0.54
1:B:102:PHE:HB3	1:B:264:VAL:HB	1.91	0.53
1:C:225:ALA:HA	1:C:231:TYR:HB3	1.90	0.53
1:C:246:LYS:HE3	1:C:247:GLU:N	2.24	0.53
1:C:162:GLU:OE1	1:C:231:TYR:OH	2.23	0.53
1:B:239:PHE:HE1	1:B:241:VAL:HG22	1.73	0.52
1:A:237:SER:HB3	1:A:265:ASP:HB3	1.91	0.52
1:B:306:THR:HG23	1:B:307:PRO:HD2	1.92	0.52
1:A:364:GLU:HB2	7:A:2119:HOH:O	2.09	0.52
1:C:94:ILE:C	1:C:96:GLY:H	2.18	0.52
1:C:240:SER:OG	1:C:262:ASN:ND2	2.43	0.52
1:A:97:TYR:CZ	7:A:2119:HOH:O	2.54	0.52
1:C:116:GLU:HB2	2:C:1364:2XA:HAH	1.92	0.51
1:C:246:LYS:HE3	1:C:247:GLU:H	1.76	0.51
1:A:31:ALA:O	1:A:34:LYS:HG3	2.08	0.51
1:B:247:GLU:OE1	1:B:257:LYS:HE2	2.10	0.51
1:C:237:SER:HB2	1:C:265:ASP:HB3	1.93	0.51
1:B:47:ARG:HG3	1:B:47:ARG:HH11	1.74	0.51
1:C:173:ASN:CG	1:C:174:PRO:HD2	2.35	0.51
1:C:246:LYS:CE	1:C:254:GLU:HB3	2.40	0.51
1:A:307:PRO:HG2	7:A:2094:HOH:O	2.09	0.50
1:C:98:ASN:O	1:C:328:THR:HB	2.11	0.50
1:A:19:ILE:HD12	1:A:359:ILE:HB	1.93	0.50
1:B:87[A]:CYS:HB2	1:B:88:PRO:HD3	1.92	0.50
1:A:82:TYR:CD2	1:A:86:VAL:HB	2.47	0.50
1:A:40:ILE:HD13	1:A:340:SER:HA	1.94	0.50
1:C:62:SER:O	1:C:63:ARG:HD3	2.12	0.50
1:A:44:ASP:OD2	1:A:47:ARG:NH1	2.45	0.49
1:C:246:LYS:HE2	1:C:254:GLU:CG	2.41	0.49
1:A:30:LEU:CD1	1:A:31:ALA:H	2.22	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:82:TYR:CE2	1:A:86:VAL:HB	2.47	0.49
1:B:138:ARG:O	1:B:141[A]:HIS:CD2	2.66	0.49
1:A:69:ASP:O	1:A:70:MET:HG3	2.12	0.49
1:C:246:LYS:NZ	1:C:254:GLU:HB3	2.27	0.49
1:A:240:SER:OG	1:A:262:ASN:ND2	2.45	0.49
1:C:55:GLY:O	1:C:56:GLY:C	2.54	0.49
1:A:205:HIS:HB2	1:A:209:GLU:OE2	2.12	0.49
1:C:187:ASP:O	1:C:190:ASN:O	2.31	0.49
1:B:206:ASN:OD1	1:B:208:ASP:CB	2.61	0.48
1:C:294:THR:HG21	1:C:314:SER:CB	2.44	0.48
1:A:161:LEU:C	1:A:161:LEU:HD12	2.39	0.47
1:A:97:TYR:CE2	7:A:2119:HOH:O	2.67	0.47
1:B:240:SER:OG	1:B:262:ASN:ND2	2.47	0.47
1:A:293:LEU:HD21	1:A:297[A]:ARG:NH2	2.30	0.47
1:C:93:VAL:HG21	1:C:261:LEU:HB2	1.97	0.47
1:B:47:ARG:HG3	1:B:47:ARG:NH1	2.30	0.47
1:C:161:LEU:HD12	1:C:161:LEU:C	2.39	0.47
1:C:48:LYS:HB3	1:C:68:PHE:O	2.15	0.46
1:B:225:ALA:HA	1:B:231:TYR:HB3	1.97	0.46
1:C:106:GLN:HE22	1:C:342:ASN:HD22	1.63	0.46
1:C:163:ILE:HG12	1:C:168:LEU:HD23	1.98	0.46
1:C:168:LEU:HB2	1:C:182:LEU:HB2	1.97	0.46
1:C:183:GLN:HG3	7:C:2016:HOH:O	2.15	0.46
1:C:184:MET:HE3	1:C:184:MET:HB2	1.77	0.46
1:C:177:ASP:OD2	1:C:179:SER:OG	2.33	0.46
1:C:126:THR:OG1	1:C:129:GLU:HB2	2.16	0.45
1:C:223:THR:O	1:C:224:ALA:C	2.59	0.45
1:B:175:SER:O	1:B:220:LYS:HE3	2.16	0.45
1:A:87[B]:CYS:HB3	1:A:88:PRO:CD	2.45	0.45
1:B:300:THR:O	1:B:303:VAL:HG22	2.17	0.45
1:A:327:ARG:O	1:A:363:PRO:HA	2.17	0.45
1:B:113:PHE:CE2	4:B:1367:ADP:C6	3.04	0.45
2:B:1365:2XA:HAF	2:B:1365:2XA:HAE	1.97	0.45
1:B:216:LYS:HB3	7:B:2076:HOH:O	2.16	0.45
1:A:240:SER:HB3	1:A:260:LYS:NZ	2.32	0.45
1:C:305:ARG:H	1:C:305:ARG:HG2	1.51	0.45
1:C:97:TYR:C	1:C:98:ASN:HD22	2.25	0.45
1:A:87[A]:CYS:HB2	1:A:88:PRO:HD3	2.00	0.44
2:B:1365:2XA:CAF	2:B:1365:2XA:HAM	2.46	0.44
1:A:292:LEU:HD12	1:A:292:LEU:HA	1.79	0.44
1:A:136:ILE:N	1:A:137:PRO:HD2	2.32	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:152:THR:HB	1:A:246:LYS:O	2.18	0.44
1:B:48[A]:LYS:HG3	1:B:67:THR:HG23	1.98	0.44
1:C:144:PHE:CZ	1:C:204:VAL:HG12	2.53	0.44
1:A:245:MET:HE3	1:A:245:MET:HB2	1.86	0.44
1:B:30:LEU:HD13	1:B:31:ALA:H	1.81	0.44
1:B:102:PHE:CB	1:B:264:VAL:HB	2.48	0.44
1:C:173:ASN:OD1	1:C:174:PRO:HD2	2.17	0.44
1:A:245:MET:HE3	1:A:257:LYS:HG3	1.99	0.44
1:C:291:SER:HA	1:C:314:SER:HB2	1.99	0.44
1:C:44:ASP:OD2	1:C:47:ARG:HG3	2.18	0.43
1:A:330:THR:HG22	1:A:331:SER:N	2.34	0.43
1:C:140:LEU:HD23	1:C:140:LEU:HA	1.76	0.43
1:C:191:LYS:HG2	7:C:2036:HOH:O	2.18	0.43
1:C:238:VAL:HG22	1:C:264:VAL:HG22	1.98	0.43
1:C:119:ARG:HA	1:C:119:ARG:HD2	1.83	0.43
1:B:102:PHE:CD1	1:B:266:LEU:HD11	2.54	0.43
1:A:245:MET:O	1:A:256:VAL:HA	2.19	0.43
1:A:116:GLU:HG2	2:A:1365:2XA:CAH	2.49	0.42
1:A:225:ALA:HA	1:A:231:TYR:HB3	2.01	0.42
1:B:29:ASN:HA	1:B:33[A]:ARG:HH21	1.84	0.42
1:A:95[A]:MET:HA	1:A:95[A]:MET:HE2	2.01	0.42
1:C:154:PHE:HA	1:C:244:HIS:O	2.18	0.42
1:C:94:ILE:C	1:C:96:GLY:N	2.77	0.42
1:B:53:ARG:HA	1:B:63:ARG:HD3	2.01	0.42
1:C:59:ASP:OD1	1:C:59:ASP:C	2.62	0.42
1:C:183:GLN:CG	7:C:2016:HOH:O	2.67	0.42
1:A:180:GLU:CB	1:C:57:LEU:HG	2.50	0.42
1:C:320:LEU:O	1:C:321:GLN:C	2.63	0.42
1:C:19:ILE:O	1:C:357:LYS:HE3	2.20	0.41
1:C:293:LEU:HD12	1:C:297:ARG:NH1	2.35	0.41
1:C:170:ASP:CG	1:C:173:ASN:HB2	2.46	0.41
1:A:59:ASP:OD2	1:A:62:SER:CB	2.68	0.41
1:A:293:LEU:HD21	1:A:297[A]:ARG:CZ	2.50	0.41
1:B:30:LEU:CD1	7:B:2007:HOH:O	2.65	0.41
2:B:1365:2XA:CAF	2:B:1365:2XA:CAM	2.97	0.41
1:C:128:GLU:OE1	1:C:141:HIS:CE1	2.74	0.41
1:A:102:PHE:HB3	1:A:264:VAL:HB	2.01	0.41
1:A:306:THR:HG22	7:A:2094:HOH:O	2.20	0.41
1:B:323:SER:HA	1:B:328:THR:HB	2.02	0.41
1:C:115:MET:HE1	1:C:263:LEU:HD22	2.03	0.41
1:A:234:ARG:HD2	1:A:288:ILE:CG1	2.51	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:115:MET:HE1	1:C:263:LEU:HB3	2.02	0.40
1:C:234:ARG:HD3	7:C:2050:HOH:O	2.21	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	328/368 (89%)	316 (96%)	10 (3%)	2 (1%)	21	42
1	B	329/368 (89%)	321 (98%)	7 (2%)	1 (0%)	36	58
1	C	327/368 (89%)	308 (94%)	14 (4%)	5 (2%)	8	18
All	All	984/1104 (89%)	945 (96%)	31 (3%)	8 (1%)	16	34

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	207	LYS
1	A	150	ASN
1	A	207	LYS
1	C	123	GLU
1	C	321	GLN
1	C	95	MET
1	C	122	ASN
1	B	305	ARG

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	289/322 (90%)	273 (94%)	16 (6%)	19	41
1	B	294/322 (91%)	267 (91%)	27 (9%)	8	19
1	C	288/322 (89%)	266 (92%)	22 (8%)	12	27
All	All	871/966 (90%)	806 (92%)	65 (8%)	13	28

All (65) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	30	LEU
1	A	84	SER
1	A	128	GLU
1	A	207	LYS
1	A	212	GLN
1	A	220	LYS
1	A	232[A]	SER
1	A	232[B]	SER
1	A	245	MET
1	A	246	LYS
1	A	255	LEU
1	A	256	VAL
1	A	293	LEU
1	A	337	SER
1	A	340	SER
1	A	362	LYS
1	B	30	LEU
1	B	64	LYS
1	B	95	MET
1	B	106	GLN
1	B	141[A]	HIS
1	B	141[B]	HIS
1	B	148	THR
1	B	150	ASN
1	B	171	LEU
1	B	182	LEU
1	B	191	LYS
1	B	195	ILE
1	B	197	LYS
1	B	220	LYS
1	B	237	SER

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Mol	Chain	Res	Type
1	B	240	SER
1	B	258	ILE
1	B	304	GLU
1	B	306	THR
1	B	319	ILE
1	B	322	ASP
1	B	329	ARG
1	B	337	SER
1	B	344	GLU
1	B	348	SER
1	B	360	LEU
1	B	362	LYS
1	C	19	ILE
1	C	30	LEU
1	C	75	SER
1	C	84	SER
1	C	89	ILE
1	C	145	GLU
1	C	152	THR
1	C	183	GLN
1	C	237	SER
1	C	240	SER
1	C	241	VAL
1	C	246	LYS
1	C	248	THR
1	C	255	LEU
1	C	256	VAL
1	C	293	LEU
1	C	294	THR
1	C	297	ARG
1	C	305	ARG
1	C	306	THR
1	C	329	ARG
1	C	360	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (23) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	38	HIS
1	A	141	HIS
1	A	142	GLN
1	A	165	ASN

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Mol	Chain	Res	Type
1	A	212	GLN
1	A	262	ASN
1	A	321	GLN
1	A	342	ASN
1	B	38	HIS
1	B	142	GLN
1	B	150	ASN
1	B	205	HIS
1	B	229	ASN
1	B	244	HIS
1	B	262	ASN
1	B	290	GLN
1	B	321	GLN
1	C	98	ASN
1	C	106	GLN
1	C	141	HIS
1	C	183	GLN
1	C	244	HIS
1	C	262	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 13 ligands modelled in this entry, 4 are monoatomic - leaving 9 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	2XA	B	1365	-	28,29,29	0.95	2 (7%)	35,40,40	1.13	4 (11%)
6	SO4	B	1368	-	4,4,4	0.26	0	6,6,6	0.19	0
4	ADP	C	1366	3	28,29,29	1.57	3 (10%)	43,45,45	1.86	13 (30%)
6	SO4	C	1367	-	4,4,4	0.26	0	6,6,6	0.23	0
2	2XA	C	1364	-	28,29,29	0.64	0	35,40,40	0.94	1 (2%)
4	ADP	A	1367	3	28,29,29	1.71	5 (17%)	43,45,45	2.10	11 (25%)
2	2XA	A	1365	-	28,29,29	0.67	0	35,40,40	1.00	1 (2%)
6	SO4	B	1369	-	4,4,4	0.28	0	6,6,6	0.17	0
4	ADP	B	1367	3	28,29,29	1.61	6 (21%)	43,45,45	2.16	11 (25%)

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	2XA	B	1365	-	-	2/28/28/28	0/3/3/3
4	ADP	C	1366	3	-	2/16/32/32	0/3/3/3
2	2XA	C	1364	-	-	9/28/28/28	0/3/3/3
4	ADP	A	1367	3	-	1/16/32/32	0/3/3/3
2	2XA	A	1365	-	-	4/28/28/28	0/3/3/3
4	ADP	B	1367	3	-	1/16/32/32	0/3/3/3

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	1366	ADP	C5-C4	5.65	1.49	1.39
4	A	1367	ADP	C5-C4	5.52	1.48	1.39
4	B	1367	ADP	C5-C4	5.17	1.48	1.39
4	A	1367	ADP	PA-O3A	3.60	1.63	1.59
4	A	1367	ADP	C5-C6	3.58	1.51	1.41
4	C	1366	ADP	C5-C6	3.27	1.50	1.41
4	B	1367	ADP	C5-C6	3.02	1.49	1.41
4	B	1367	ADP	PA-O3A	2.89	1.62	1.59
4	B	1367	ADP	C5-N7	-2.54	1.34	1.39
4	C	1366	ADP	C8-N7	2.32	1.36	1.31
2	B	1365	2XA	CAZ-SG	2.17	1.90	1.86

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	1367	ADP	C8-N7	2.13	1.35	1.31
2	B	1365	2XA	CB-SG	2.11	1.88	1.82
4	A	1367	ADP	C5-N7	-2.03	1.35	1.39
4	B	1367	ADP	C8-N9	-2.02	1.34	1.37
4	B	1367	ADP	C8-N7	2.00	1.35	1.31

All (41) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	1367	ADP	C5-C4-N3	-6.68	117.52	126.72
4	A	1367	ADP	C5-C4-N3	-6.61	117.62	126.72
4	B	1367	ADP	N3-C4-N9	5.88	137.17	127.17
4	A	1367	ADP	N3-C4-N9	4.91	135.51	127.17
4	A	1367	ADP	C4-C5-N7	-4.77	105.13	110.58
4	A	1367	ADP	C2-N3-C4	4.48	122.77	111.83
4	C	1366	ADP	N3-C2-N1	-4.13	122.33	128.58
4	B	1367	ADP	C4-C5-N7	-4.11	105.88	110.58
4	C	1366	ADP	C5-C4-N3	-4.10	121.06	126.72
4	A	1367	ADP	N3-C2-N1	-3.95	122.60	128.58
4	B	1367	ADP	C2-N3-C4	3.87	121.29	111.83
4	B	1367	ADP	C4-N9-C8	3.79	109.72	105.74
4	C	1366	ADP	N3-C4-N9	3.72	133.50	127.17
4	C	1366	ADP	C4-N9-C8	3.68	109.60	105.74
4	B	1367	ADP	C5-N7-C8	3.64	109.17	103.45
4	C	1366	ADP	C4-C5-N7	-3.54	106.54	110.58
4	A	1367	ADP	C5-N7-C8	3.44	108.86	103.45
4	C	1366	ADP	C2-N3-C4	3.42	120.17	111.83
4	C	1366	ADP	C2-N1-C6	3.29	124.14	118.73
4	C	1366	ADP	C6-C5-N7	3.22	138.30	132.09
4	B	1367	ADP	N3-C2-N1	-2.87	124.24	128.58
4	A	1367	ADP	C6-C5-N7	2.83	137.56	132.09
4	B	1367	ADP	N9-C8-N7	-2.83	109.92	113.94
2	B	1365	2XA	CB-SG-CAZ	2.68	109.80	103.71
2	A	1365	2XA	CB-SG-CAZ	2.61	109.64	103.71
4	C	1366	ADP	C5-N7-C8	2.52	107.41	103.45
2	C	1364	2XA	CB-SG-CAZ	2.47	109.32	103.71
2	B	1365	2XA	CAG-CAD-CL	-2.38	115.85	119.36
2	B	1365	2XA	CAM-CAG-CAD	-2.29	116.94	119.24
4	C	1366	ADP	O2A-PA-O1A	2.27	123.00	112.44
4	B	1367	ADP	O5'-C5'-C4'	-2.27	101.28	108.99
4	A	1367	ADP	C2-N1-C6	2.22	122.38	118.73
4	C	1366	ADP	C4-N9-C1'	-2.21	121.46	126.63

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1367	ADP	O3B-PB-O2B	2.21	116.08	107.80
4	A	1367	ADP	O4'-C1'-N9	2.17	112.25	108.09
4	C	1366	ADP	O3B-PB-O2B	2.15	115.88	107.80
4	B	1367	ADP	C3'-C2'-C1'	2.13	105.50	101.46
2	B	1365	2XA	CAH-CAD-CAG	2.13	123.87	121.24
4	C	1366	ADP	N9-C8-N7	-2.06	111.01	113.94
4	B	1367	ADP	C6-C5-N7	2.06	136.06	132.09
4	A	1367	ADP	O2A-PA-O3A	2.05	112.82	107.27

There are no chirality outliers.

All (19) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	1365	2XA	O-C-CA-N
2	C	1364	2XA	N-CA-CB-SG
2	C	1364	2XA	C-CA-CB-SG
2	C	1364	2XA	CAV-CAZ-SG-CB
4	B	1367	ADP	PA-O3A-PB-O2B
4	C	1366	ADP	C5'-O5'-PA-O1A
2	C	1364	2XA	OXT-C-CA-N
2	C	1364	2XA	CAK-CAZ-SG-CB
2	B	1365	2XA	OXT-C-CA-N
2	C	1364	2XA	CAI-CAZ-SG-CB
4	A	1367	ADP	PA-O3A-PB-O2B
4	C	1366	ADP	C5'-O5'-PA-O3A
2	A	1365	2XA	OXT-C-CA-CB
2	A	1365	2XA	O-C-CA-CB
2	C	1364	2XA	CAN-CAV-CAZ-SG
2	A	1365	2XA	CAN-CAV-CAZ-SG
2	A	1365	2XA	CAM-CAV-CAZ-SG
2	C	1364	2XA	CAM-CAV-CAZ-SG
2	C	1364	2XA	O-C-CA-N

There are no ring outliers.

5 monomers are involved in 11 short contacts:

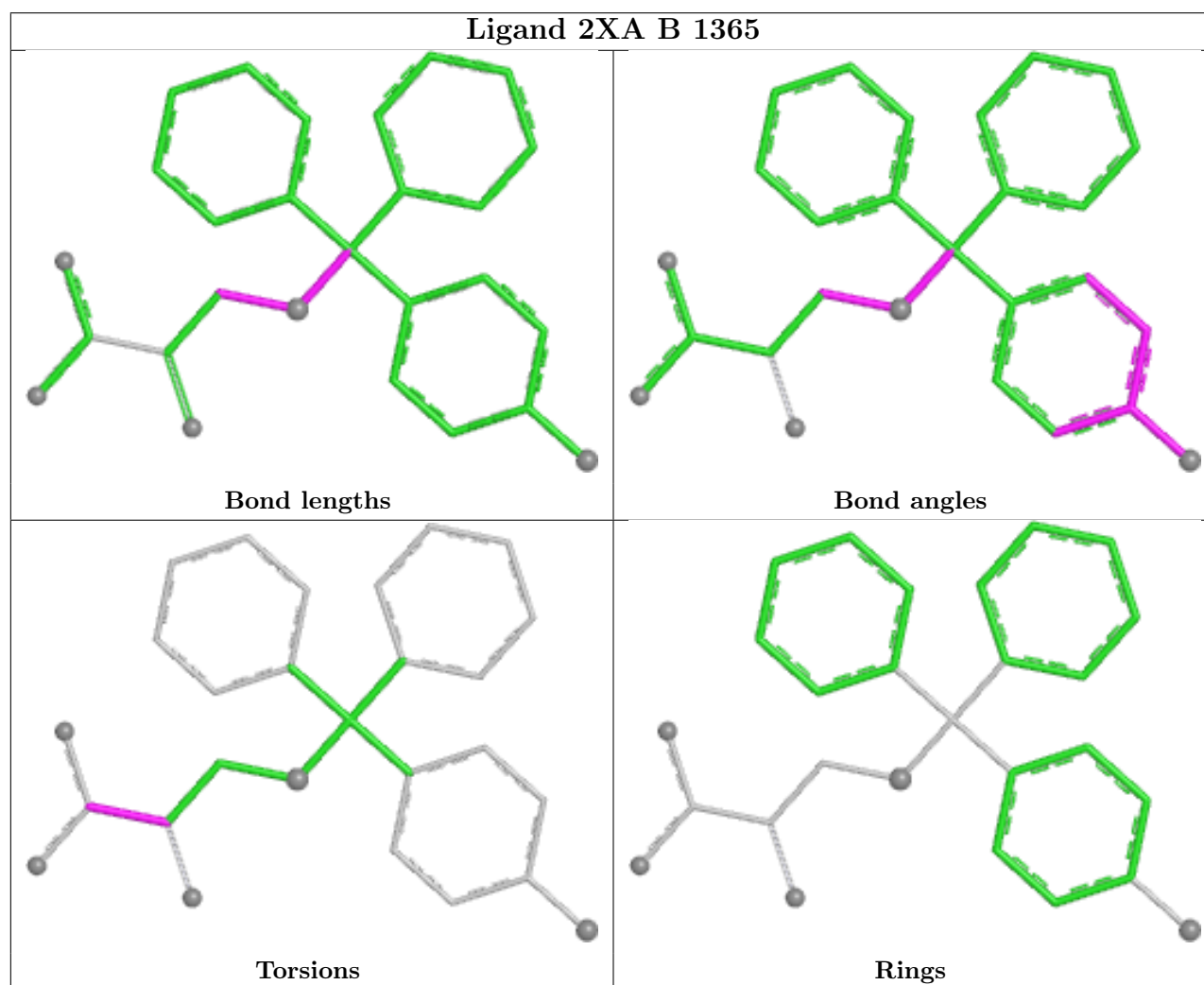
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	1365	2XA	3	0
2	C	1364	2XA	2	0
4	A	1367	ADP	1	0
2	A	1365	2XA	3	0

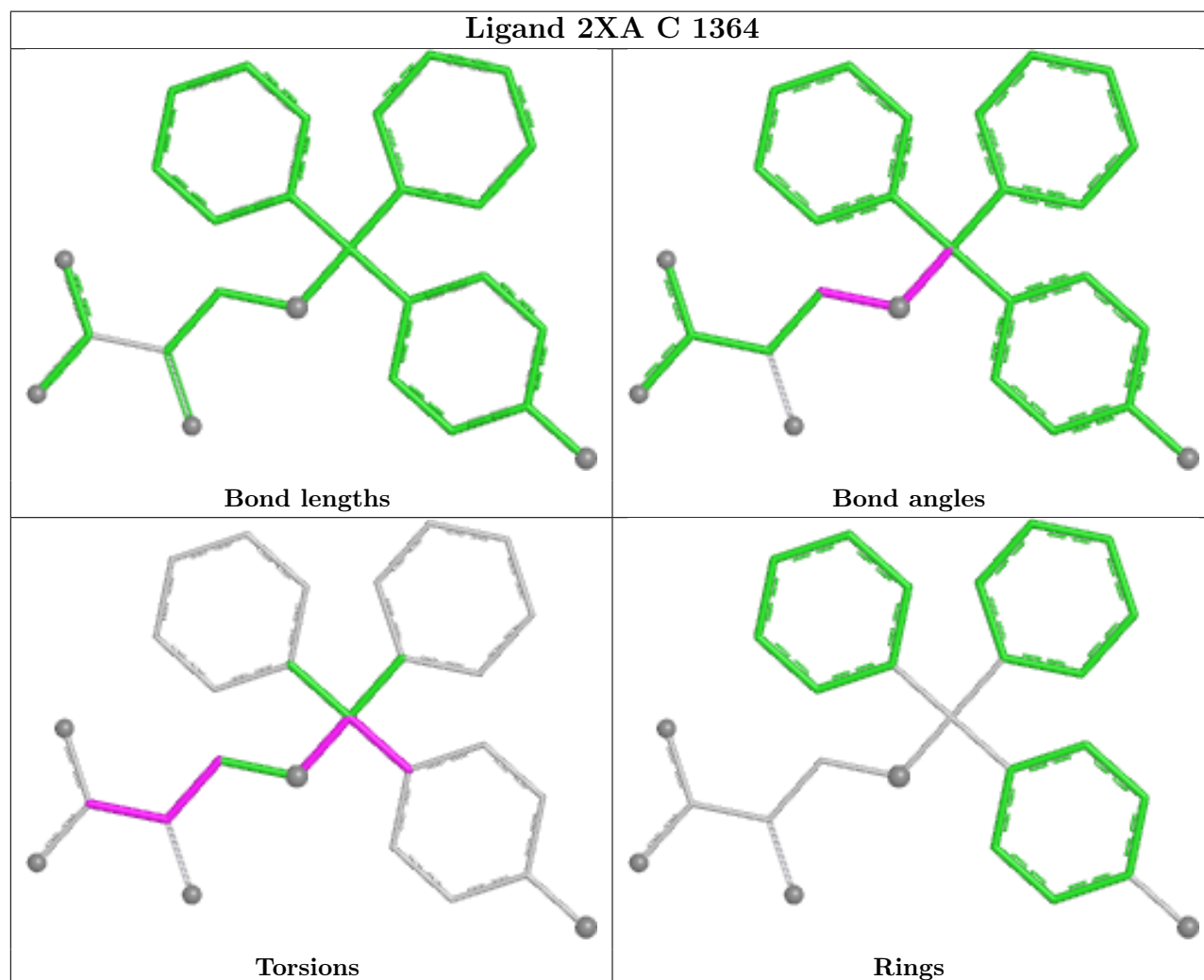
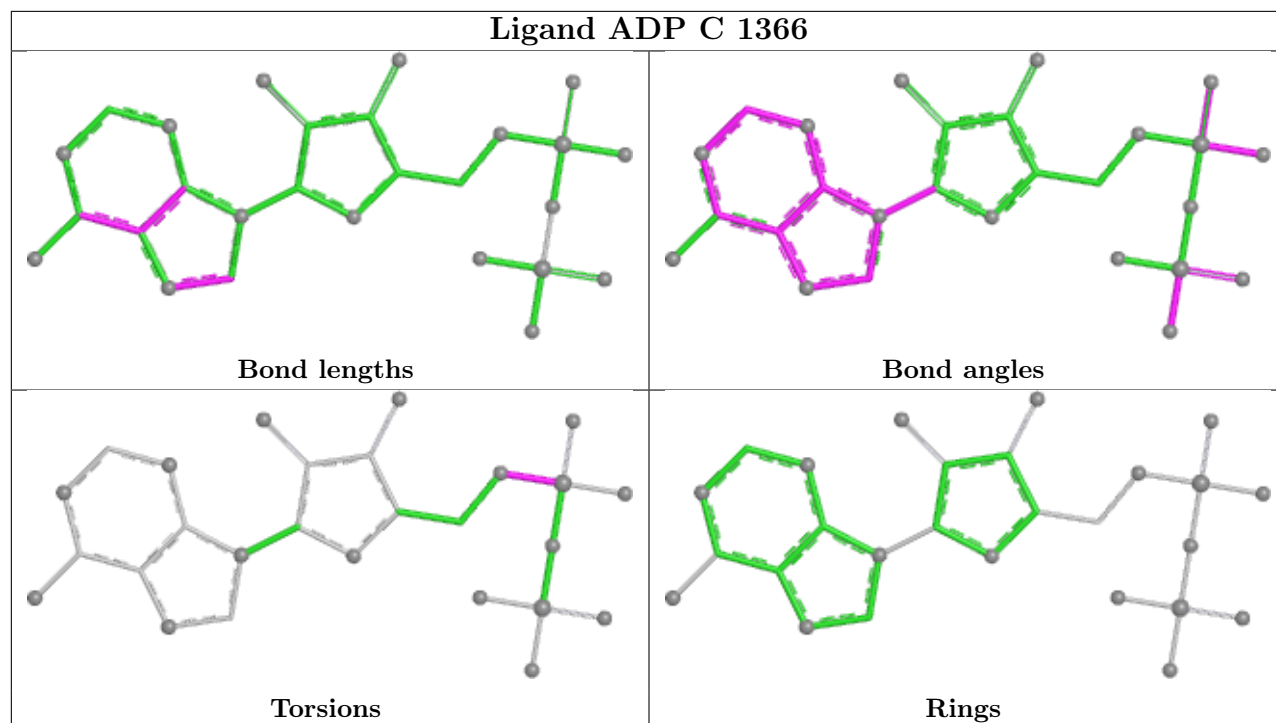
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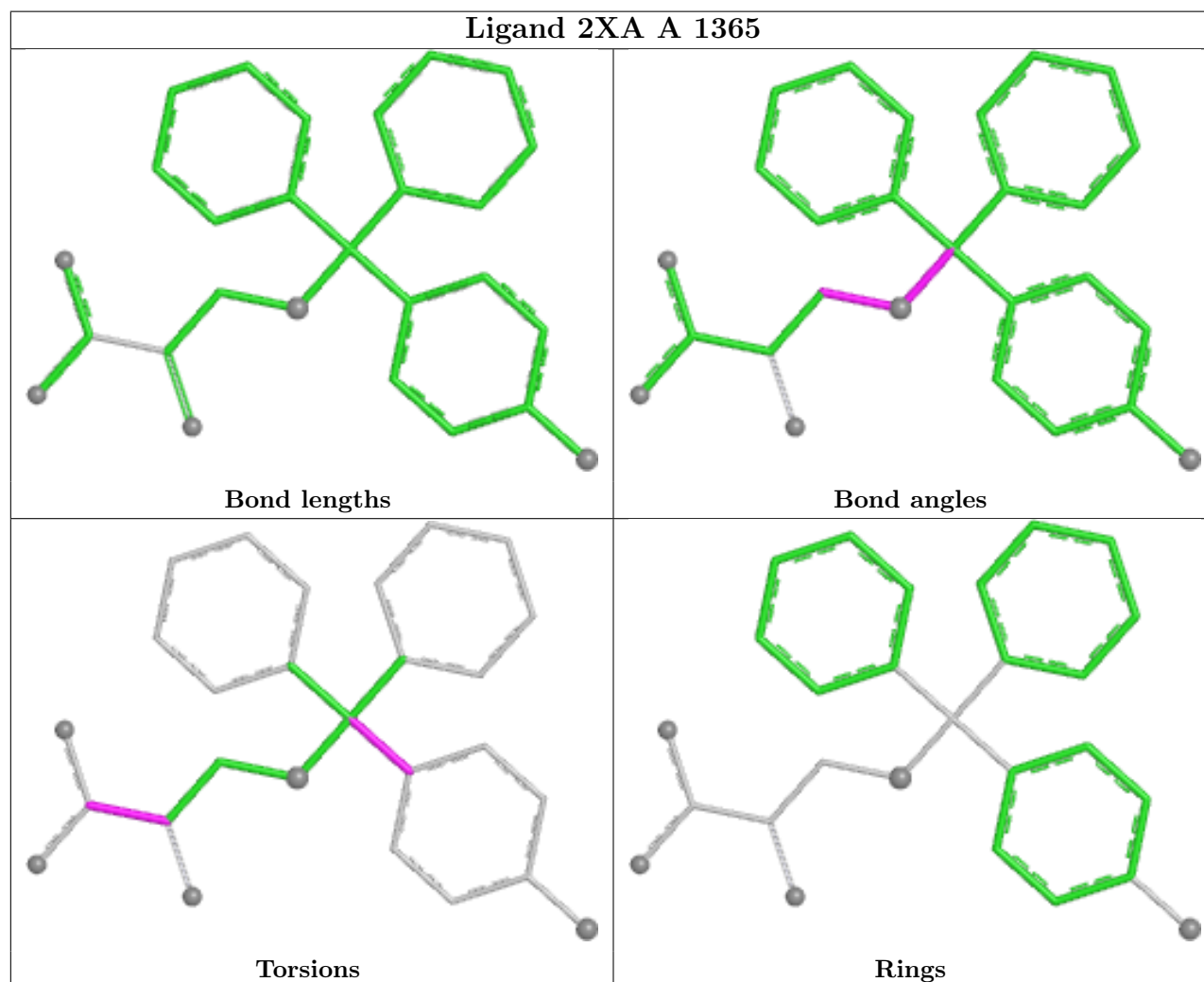
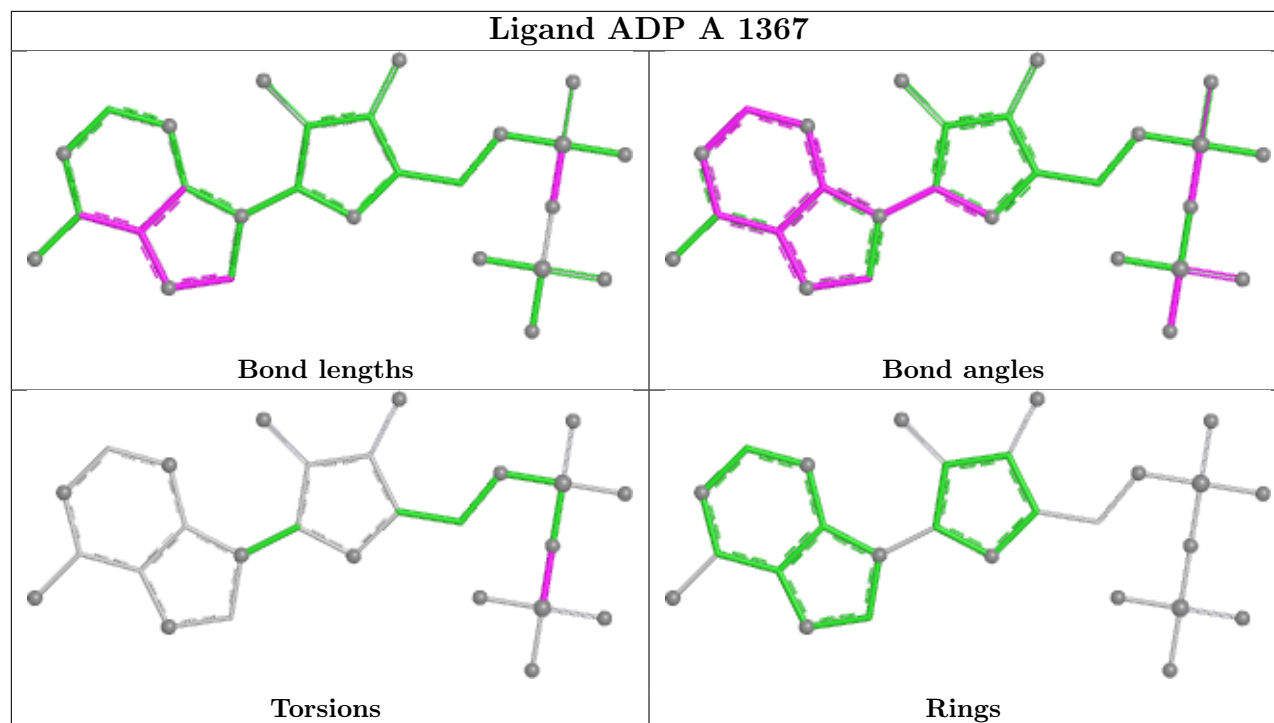
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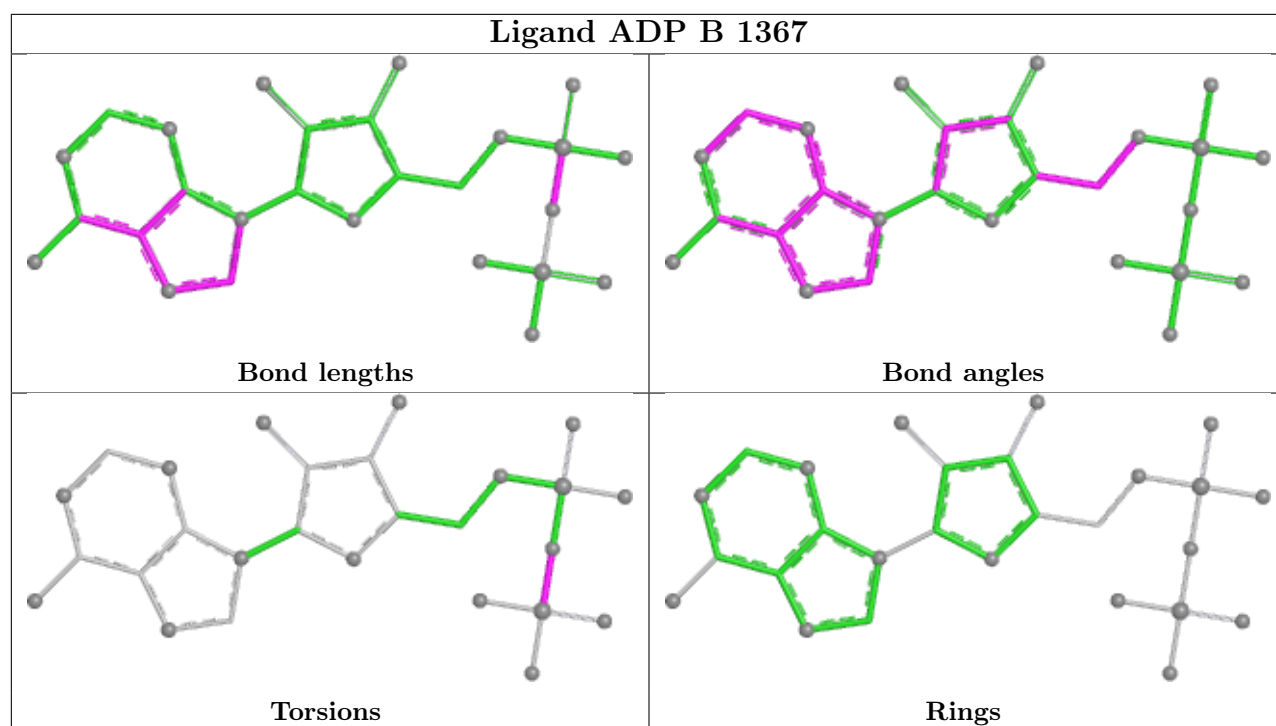
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	1367	ADP	2	0

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	328/368 (89%)	-0.54	2 (0%) 85 83	16, 35, 63, 74	6 (1%)
1	B	328/368 (89%)	-0.55	2 (0%) 85 83	15, 32, 63, 78	7 (2%)
1	C	329/368 (89%)	-0.21	6 (1%) 67 63	21, 47, 69, 82	2 (0%)
All	All	985/1104 (89%)	-0.43	10 (1%) 79 76	15, 37, 66, 82	15 (1%)

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	325	GLY	3.3
1	B	255	LEU	2.9
1	C	326	GLY	2.6
1	C	363	PRO	2.6
1	A	152	THR	2.4
1	C	307	PRO	2.3
1	C	327	ARG	2.2
1	A	149	ASP	2.1
1	C	360	LEU	2.1
1	B	254	GLU	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

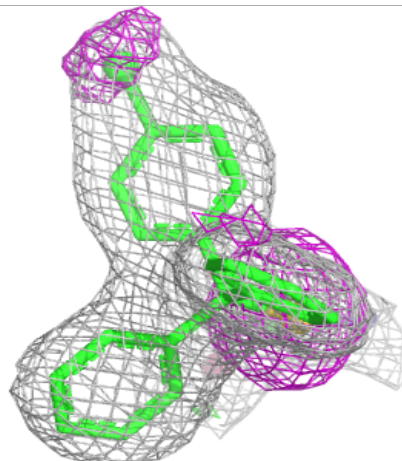
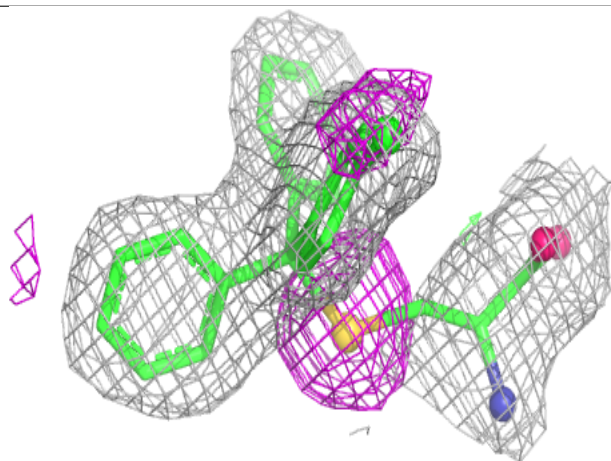
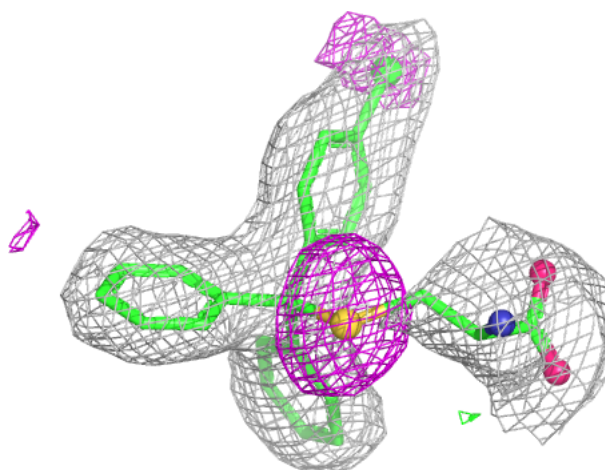
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	2XA	B	1365	27/27	0.80	0.13	25,42,61,61	0
2	2XA	A	1365	27/27	0.83	0.15	47,58,76,76	0
2	2XA	C	1364	27/27	0.84	0.15	66,70,84,84	0
3	MG	C	1365	1/1	0.91	0.09	79,79,79,79	0
6	SO4	B	1368	5/5	0.92	0.10	87,88,88,89	0
5	CL	A	1368	1/1	0.93	0.07	62,62,62,62	0
6	SO4	B	1369	5/5	0.93	0.12	91,91,92,92	0
4	ADP	C	1366	27/27	0.95	0.10	32,69,73,73	0
6	SO4	C	1367	5/5	0.95	0.10	87,87,87,88	0
3	MG	A	1366	1/1	0.96	0.05	40,40,40,40	0
4	ADP	B	1367	27/27	0.98	0.06	17,37,47,52	0
4	ADP	A	1367	27/27	0.98	0.07	21,47,55,56	0
3	MG	B	1366	1/1	0.99	0.02	23,23,23,23	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.

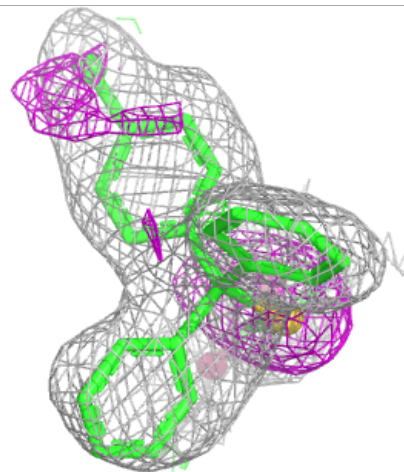
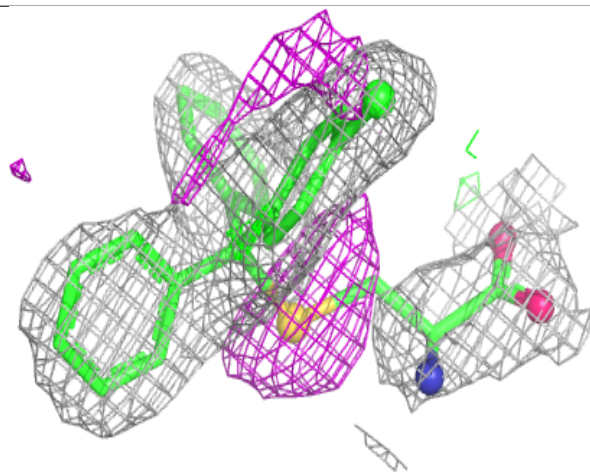
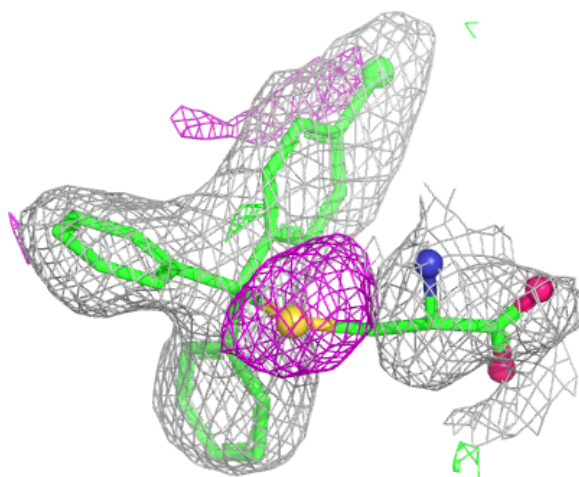
Electron density around 2XA B 1365:

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



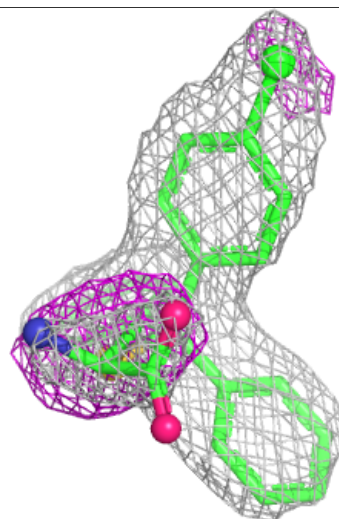
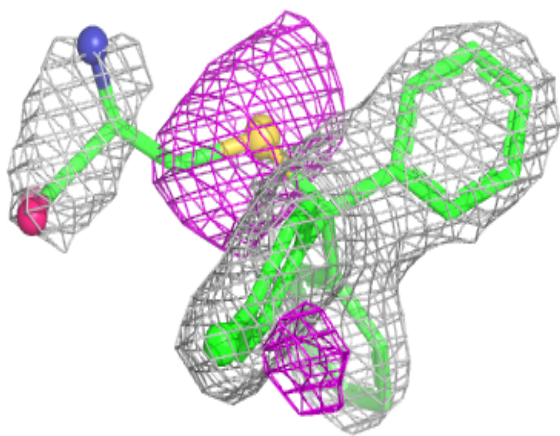
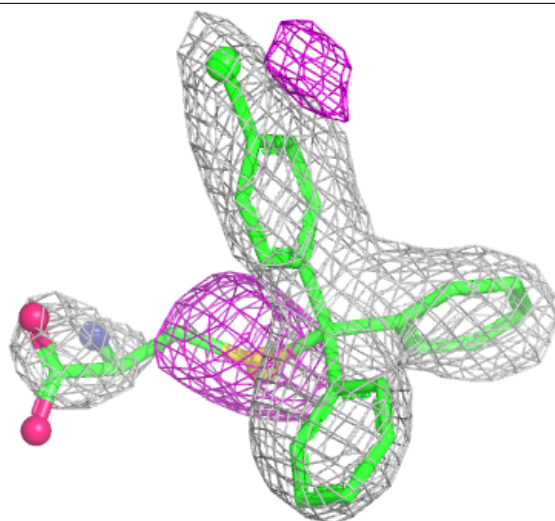
Electron density around 2XA A 1365:

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



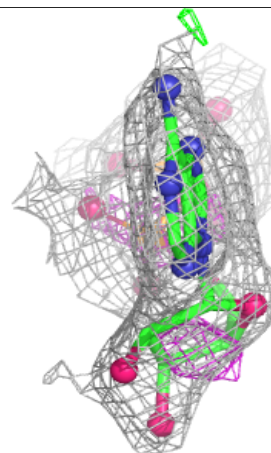
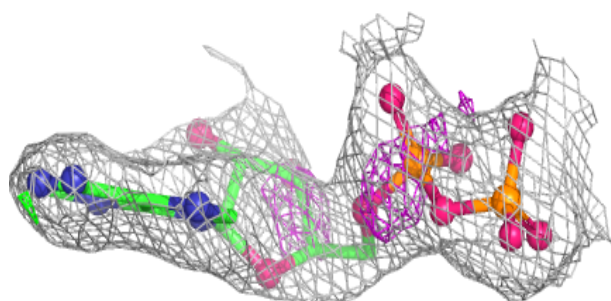
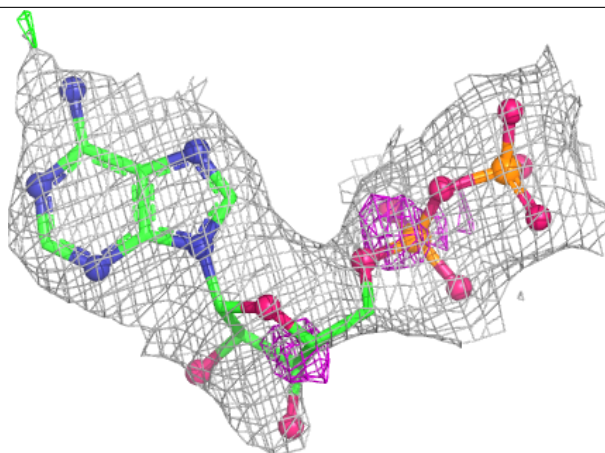
Electron density around 2XA C 1364:

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

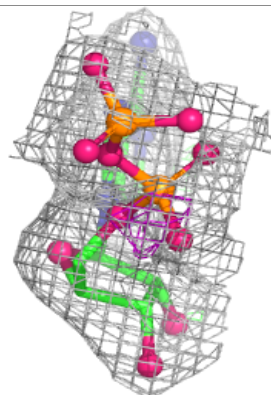
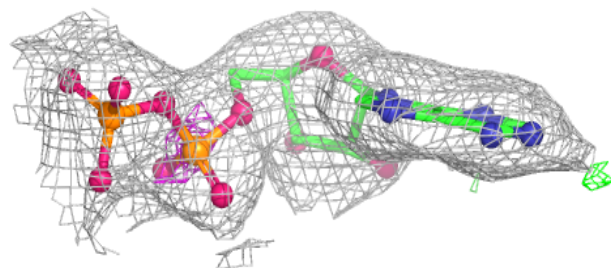
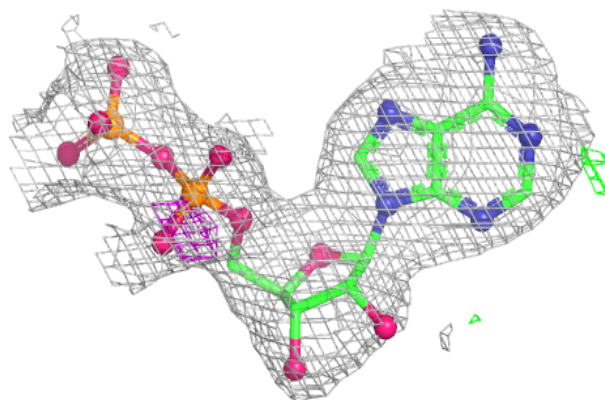


Electron density around ADP C 1366:

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

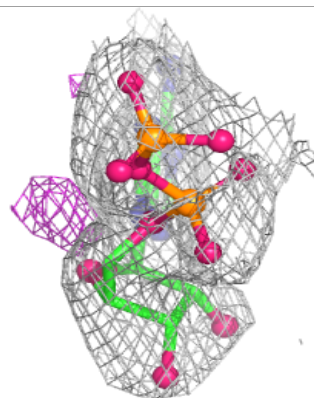
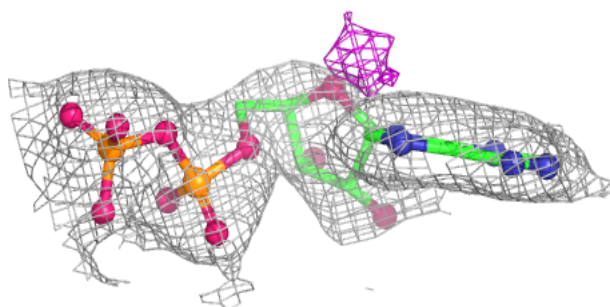
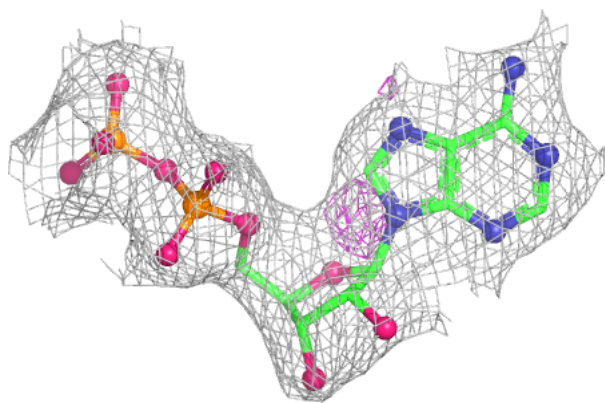
**Electron density around ADP B 1367:**

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



Electron density around ADP A 1367:

$2mF_o-DF_c$ (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.