



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 05:04 AM UTC

PDB ID : 5L3Q / pdb_00005l3q
Title : Structure of the GTPase heterodimer of human SRP54 and SRalpha
Authors : Wild, K.; Segnitz, B.; Sinning, I.
Deposited on : 2016-05-24
Resolution : 3.20 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 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

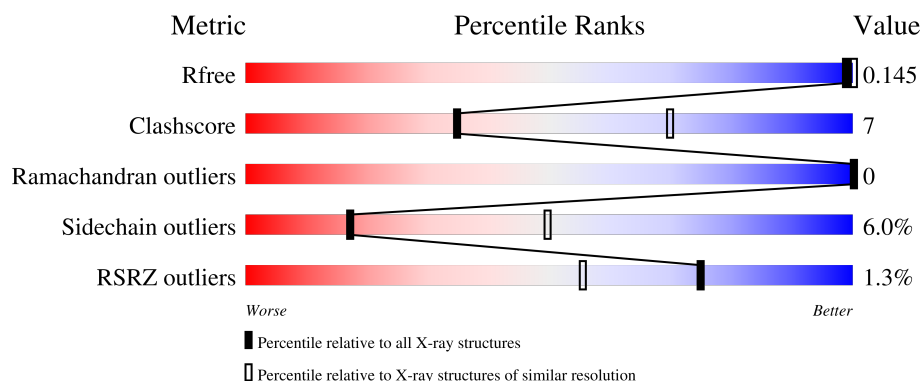
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.20 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}	180053	1466 (3.20-3.20)
Clashscore	190562	1573 (3.20-3.20)
Ramachandran outliers	187476	1548 (3.20-3.20)
Sidechain outliers	187428	1547 (3.20-3.20)
RSRZ outliers	180081	1466 (3.20-3.20)

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	442	
1	C	442	
2	B	638	
2	D	638	

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 9156 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 Signal recognition particle 54 kDa protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	265	Total	C	N	O	S	0	0	0
			2050	1308	345	386	11			
1	C	265	Total	C	N	O	S	0	0	0
			2050	1308	345	386	11			

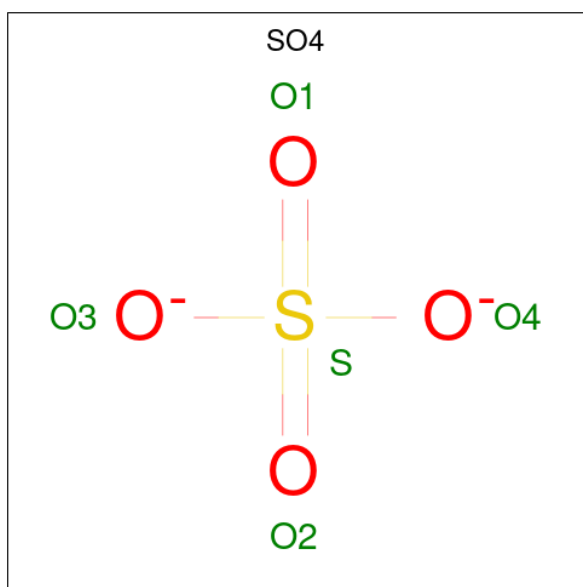
There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-5	HIS	-	expression tag	UNP P61011
A	-4	HIS	-	expression tag	UNP P61011
A	-3	HIS	-	expression tag	UNP P61011
A	-2	HIS	-	expression tag	UNP P61011
A	-1	HIS	-	expression tag	UNP P61011
A	0	HIS	-	expression tag	UNP P61011
C	-5	HIS	-	expression tag	UNP P61011
C	-4	HIS	-	expression tag	UNP P61011
C	-3	HIS	-	expression tag	UNP P61011
C	-2	HIS	-	expression tag	UNP P61011
C	-1	HIS	-	expression tag	UNP P61011
C	0	HIS	-	expression tag	UNP P61011

- Molecule 2 is a protein called Signal recognition particle receptor subunit alpha.

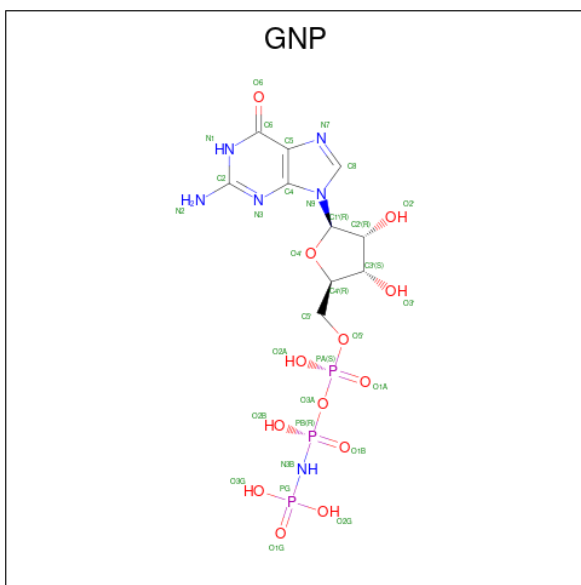
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	307	Total	C	N	O	S	0	0	0
			2340	1471	415	438	16			
2	D	307	Total	C	N	O	S	0	0	0
			2340	1471	415	438	16			

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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

- Molecule 4 is PHOSPHOAMINOPHOSPHONIC ACID-GUANYLATE ESTER (CCD ID: GNP) (formula: C₁₀H₁₇N₆O₁₃P₃).

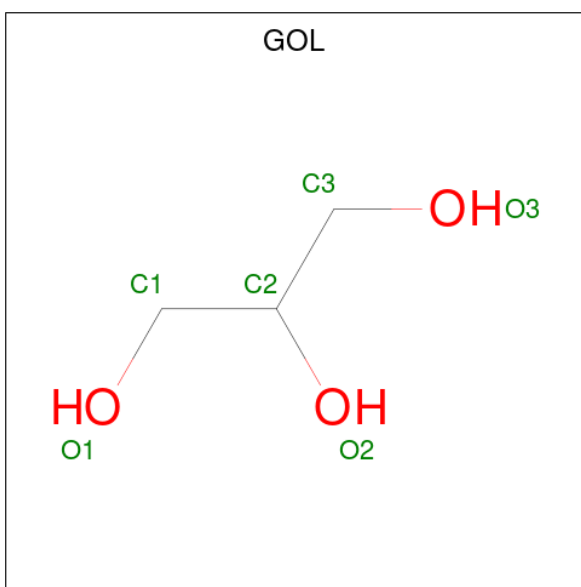


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			32	10	6	13	3		
4	B	1	Total	C	N	O	P	0	0
			32	10	6	13	3		
4	C	1	Total	C	N	O	P	0	0
			32	10	6	13	3		
4	D	1	Total	C	N	O	P	0	0
			32	10	6	13	3		

- Molecule 5 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

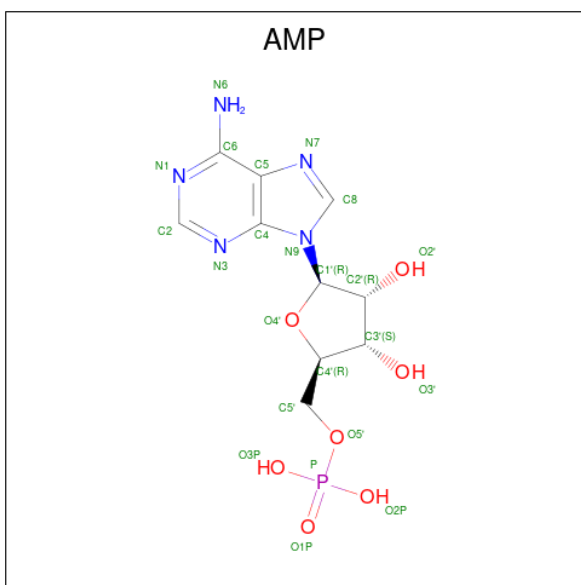
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Mg	0	0
			1	1		
5	B	1	Total	Mg	0	0
			1	1		
5	C	1	Total	Mg	0	0
			1	1		
5	D	1	Total	Mg	0	0
			1	1		

- Molecule 6 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



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

- Molecule 7 is ADENOSINE MONOPHOSPHATE (CCD ID: AMP) (formula: $C_{10}H_{14}N_5O_7P$).



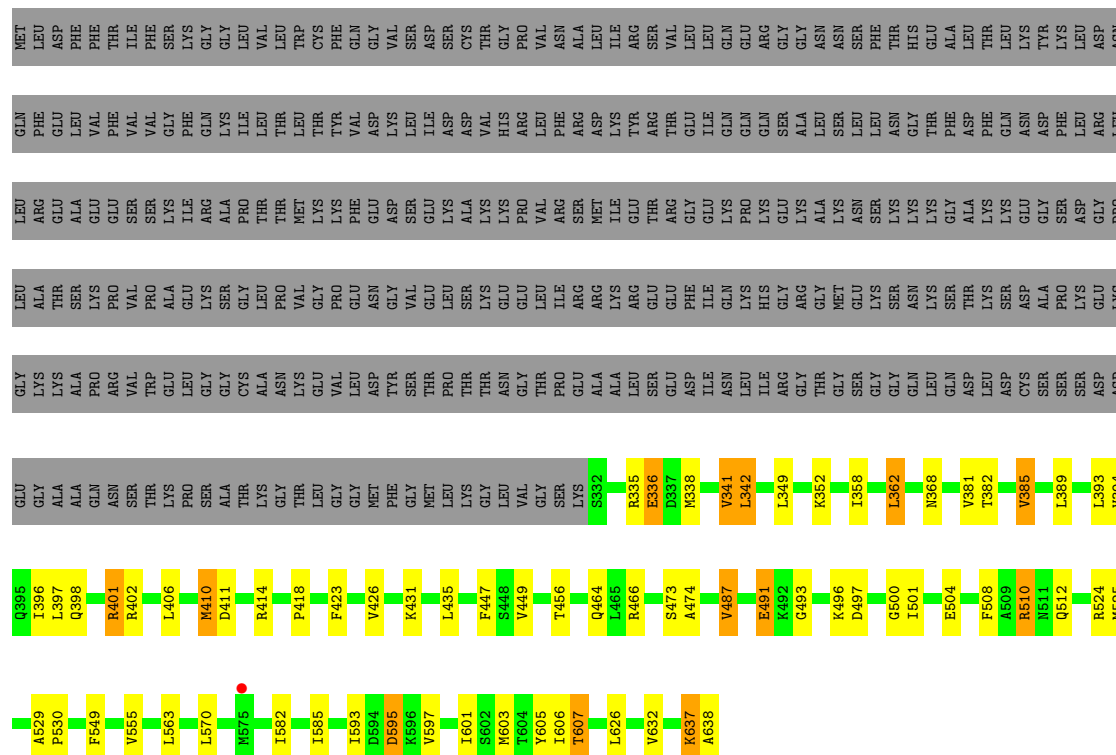
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	A	1	Total	C	N	O	P	0	0
			23	10	5	7	1		
7	C	1	Total	C	N	O	P	0	0
			23	10	5	7	1		

- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	31	Total	O	0	0
			31	31		
8	B	42	Total	O	0	0
			42	42		
8	C	20	Total	O	0	0
			20	20		
8	D	36	Total	O	0	0
			36	36		

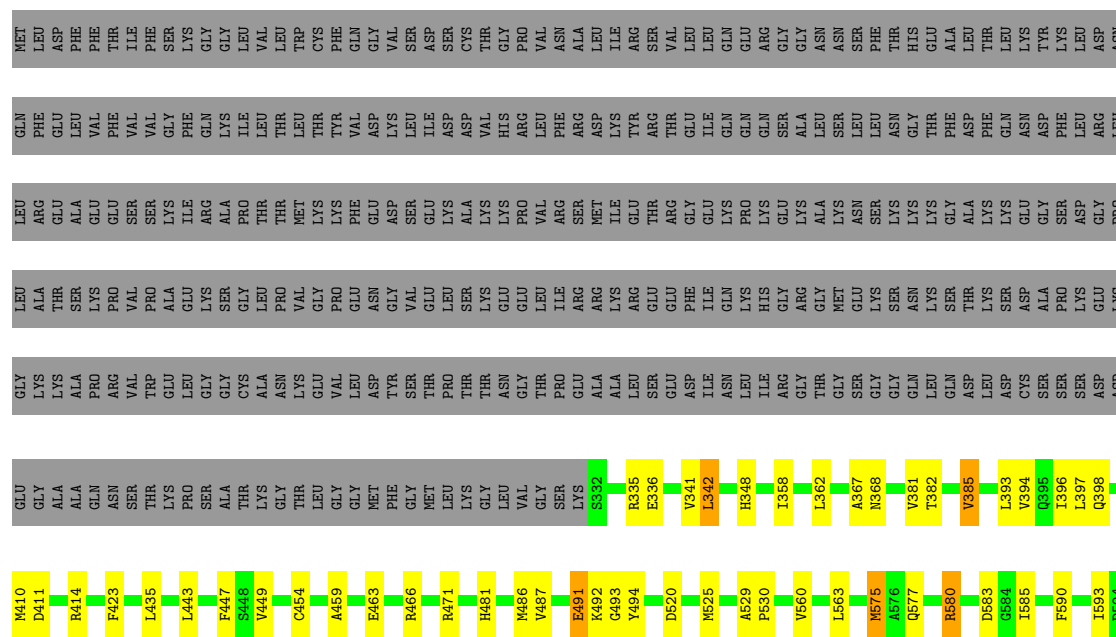
- Molecule 2: Signal recognition particle receptor subunit alpha

Chain B:  37% 9% 52%



- Molecule 2: Signal recognition particle receptor subunit alpha

Chain D:  38% 9% 52%



D595	K596	V597	I601	S602	M603	T604	Y605	I606	T607	T619	Y620	O621	V632	K637	A638
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4 Data and refinement statistics

Property	Value	Source
Space group	I 2 3	Depositor
Cell constants a, b, c, α , β , γ	241.39Å 241.39Å 241.39Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	76.33 – 3.20 76.33 – 3.20	Depositor EDS
% Data completeness (in resolution range)	99.7 (76.33-3.20) 95.8 (76.33-3.20)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.11	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.05 (at 3.19Å)	Xtriage
Refinement program	PHENIX 1.8.1_1168	Depositor
R, R_{free}	0.145 , 0.191 0.151 , 0.145	Depositor DCC
R_{free} test set	1931 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	56.9	Xtriage
Anisotropy	0.000	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 70.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.029 for -l,-k,-h	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	9156	wwPDB-VP
Average B, all atoms (Å ²)	62.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.16% 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: SO4, MG, GNP, GOL, AMP

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	0.58	0/2083	0.89	0/2806
1	C	0.52	0/2083	0.88	0/2806
2	B	0.64	0/2370	0.91	3/3202 (0.1%)
2	D	0.64	0/2370	0.93	1/3202 (0.0%)
All	All	0.60	0/8906	0.90	4/12016 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	637	LYS	N-CA-C	6.43	119.53	111.24
2	D	607	THR	N-CA-C	-5.61	102.10	110.23
2	B	607	THR	N-CA-C	-5.42	102.26	110.28
2	B	474	ALA	N-CA-C	-5.38	106.39	113.12

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	2050	0	2090	32	0
1	C	2050	0	2090	22	0
2	B	2340	0	2406	45	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	2340	0	2406	40	0
3	A	5	0	0	1	0
3	B	20	0	0	1	0
3	C	10	0	0	0	0
3	D	10	0	0	0	0
4	A	32	0	13	1	0
4	B	32	0	13	0	0
4	C	32	0	13	0	0
4	D	32	0	13	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0
6	A	6	0	8	2	0
6	B	6	0	8	0	0
6	C	6	0	8	0	0
6	D	6	0	8	2	0
7	A	23	0	12	2	0
7	C	23	0	12	2	0
8	A	31	0	0	0	0
8	B	42	0	0	3	0
8	C	20	0	0	1	0
8	D	36	0	0	3	0
All	All	9156	0	9100	135	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 7.

All (135) 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)
2:B:491:GLU:HG2	2:B:493:GLY:H	1.43	0.83
1:C:198:GLU:HG2	1:C:201:LEU:HG	1.67	0.76
1:A:278:HIS:CE1	7:A:505:AMP:H2'	2.28	0.69
2:D:459:ALA:H	6:D:705:GOL:H12	1.59	0.68
2:D:491:GLU:HG2	2:D:493:GLY:H	1.60	0.67
2:B:473:SER:HB3	2:B:487:VAL:HG23	1.77	0.67
2:B:411:ASP:OD1	2:B:414:ARG:NH1	2.29	0.65
1:A:252:GLY:HA3	2:B:525:MET:HE3	1.78	0.64
1:A:287:THR:H	6:A:504:GOL:H32	1.63	0.63
1:A:278:HIS:NE2	7:A:505:AMP:H2'	2.12	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:29:ASN:OD1	1:C:53:ARG:NH2	2.32	0.62
1:A:155:ALA:HB2	1:A:279:ILE:HD13	1.82	0.62
1:C:195:HIS:HD2	1:C:197:GLN:HG2	1.62	0.62
1:C:195:HIS:CD2	1:C:197:GLN:HG2	2.35	0.61
2:D:580:ARG:NH2	2:D:583:ASP:OD2	2.33	0.61
2:D:560:VAL:HG13	2:D:606:ILE:HD12	1.83	0.59
2:B:397:LEU:HD22	2:B:626:LEU:HD21	1.83	0.59
1:C:252:GLY:HA3	2:D:525:MET:HE3	1.86	0.58
1:C:87:VAL:HG21	1:C:291:ILE:HD11	1.86	0.57
2:B:549:PHE:HB2	2:B:582:ILE:HD13	1.87	0.57
2:B:497:ASP:N	3:B:702:SO4:O1	2.26	0.57
1:A:225:ILE:HG12	1:A:229:CYS:HB2	1.86	0.56
1:A:195:HIS:CD2	1:A:197:GLN:HG2	2.41	0.56
1:C:123:TYR:CZ	1:C:127:ARG:HD2	2.41	0.56
1:A:198:GLU:HG2	1:A:201:LEU:HG	1.89	0.55
1:C:230:GLU:HB2	1:C:261:SER:HB3	1.88	0.55
2:D:397:LEU:HD12	2:D:632:VAL:HG23	1.89	0.54
2:B:338:MET:HB3	2:B:342:LEU:HD22	1.88	0.54
1:C:145:PHE:CE1	1:C:161:GLY:HA3	2.43	0.54
1:C:225:ILE:HG12	1:C:229:CYS:HB2	1.89	0.54
2:D:358:ILE:HD12	2:D:605:TYR:CD2	2.43	0.54
1:A:142:ALA:O	2:B:464:GLN:HG3	2.08	0.54
1:C:250:LEU:HD12	1:C:273:ILE:HB	1.89	0.53
2:D:335:ARG:NH2	2:D:368:ASN:OD1	2.41	0.53
2:D:396:ILE:HD13	2:D:605:TYR:HD1	1.74	0.53
2:B:381:VAL:O	2:B:385:VAL:HG13	2.09	0.53
2:B:593:ILE:HD13	2:B:597:VAL:HA	1.90	0.52
2:B:423:PHE:CD1	2:B:435:LEU:HD12	2.44	0.52
2:D:596:LYS:HE2	8:D:834:HOH:O	2.11	0.51
2:B:595:ASP:OD2	2:B:595:ASP:N	2.43	0.51
2:B:508:PHE:CZ	2:B:512:GLN:HG3	2.46	0.51
1:A:32:LEU:HD11	1:A:56:VAL:HG11	1.92	0.50
1:A:123:TYR:CZ	1:A:127:ARG:HD2	2.46	0.50
1:A:154:LYS:HE2	3:A:501:SO4:O4	2.10	0.50
1:A:250:LEU:HD12	1:A:273:ILE:HB	1.94	0.50
2:B:418:PRO:HD3	2:B:510:ARG:HG3	1.94	0.49
1:A:31:MET:HE2	1:A:72:ARG:HB3	1.92	0.49
2:B:396:ILE:HD13	2:B:605:TYR:HD1	1.77	0.49
2:B:338:MET:O	2:B:342:LEU:HB2	2.12	0.49
1:C:138:ASP:OD2	8:C:601:HOH:O	2.20	0.49
2:B:563:LEU:HD13	2:B:607:THR:HG23	1.95	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:590:PHE:CZ	2:D:597:VAL:HG23	2.48	0.49
1:A:138:ASP:CG	1:A:192:SER:HB3	2.39	0.48
2:D:393:LEU:HD22	2:D:601:ILE:HG12	1.95	0.48
2:B:335:ARG:NH2	2:B:368:ASN:OD1	2.46	0.47
1:A:195:HIS:HD2	1:A:197:GLN:HG2	1.76	0.47
1:C:278:HIS:CE1	7:C:506:AMP:H2'	2.49	0.47
1:C:141:ARG:HB3	1:C:144:ALA:HB2	1.96	0.47
1:C:222:ASP:OD2	1:C:249:LYS:NZ	2.47	0.47
2:D:381:VAL:O	2:D:385:VAL:HG13	2.14	0.47
2:D:411:ASP:OD1	2:D:414:ARG:NH1	2.48	0.47
2:D:471:ARG:HH11	2:D:471:ARG:HG3	1.80	0.47
1:A:198:GLU:HG2	1:A:201:LEU:CG	2.45	0.47
1:C:202:PHE:HB3	1:C:239:LYS:HE3	1.96	0.47
2:D:580:ARG:CZ	2:D:580:ARG:HB3	2.45	0.46
1:A:286:LYS:HA	6:A:504:GOL:H32	1.96	0.46
2:D:563:LEU:HD22	2:D:607:THR:HG21	1.98	0.46
2:B:496:LYS:HB2	2:B:501:ILE:HD11	1.97	0.45
2:D:529:ALA:HB3	2:D:530:PRO:HD3	1.97	0.45
2:D:459:ALA:N	6:D:705:GOL:H12	2.29	0.45
1:A:87:VAL:HG21	1:A:291:ILE:HD11	1.97	0.45
2:D:637:LYS:HG3	2:D:638:ALA:N	2.31	0.45
2:B:401:ARG:H	2:B:401:ARG:HG2	1.62	0.45
2:D:348:HIS:NE2	2:D:638:ALA:HB2	2.32	0.45
2:D:577:GLN:HG2	8:D:827:HOH:O	2.17	0.45
2:B:529:ALA:HB3	2:B:530:PRO:HD3	1.98	0.45
1:A:134:LEU:O	1:A:159:PHE:HA	2.17	0.45
2:B:358:ILE:HG22	2:B:362:LEU:HD22	1.99	0.45
2:D:394:VAL:O	2:D:398:GLN:HG2	2.17	0.45
1:A:197:GLN:HE21	1:A:197:GLN:HB3	1.64	0.44
2:D:463:GLU:OE2	2:D:494:TYR:OH	2.31	0.44
2:B:406:LEU:HD22	2:B:447:PHE:HE1	1.82	0.44
1:A:138:ASP:OD1	1:A:192:SER:HB3	2.18	0.44
2:B:426:VAL:HG22	8:B:818:HOH:O	2.17	0.44
2:D:575:MET:HE3	2:D:575:MET:HA	2.00	0.44
1:C:32:LEU:HD11	1:C:56:VAL:HG11	1.99	0.44
1:A:198:GLU:HG3	1:A:201:LEU:H	1.83	0.44
2:B:500:GLY:O	2:B:504:GLU:HG3	2.17	0.44
2:D:619:THR:HG22	2:D:620:TYR:N	2.33	0.44
2:B:410:MET:HA	2:B:410:MET:HE2	1.99	0.43
2:B:341:VAL:HG21	2:B:382:THR:HA	2.00	0.43
2:B:394:VAL:O	2:B:398:GLN:HG2	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:295:LEU:HD12	1:A:295:LEU:HA	1.85	0.43
2:B:358:ILE:O	2:B:362:LEU:HB2	2.18	0.43
2:B:585:ILE:HD13	2:B:603:MET:HB3	2.01	0.43
2:B:637:LYS:O	2:B:638:ALA:C	2.61	0.43
1:C:149:LYS:HG3	1:C:159:PHE:CZ	2.53	0.43
1:A:114:LYS:NZ	4:A:502:GNP:O2B	2.51	0.42
1:A:141:ARG:HB3	1:A:144:ALA:HB2	2.00	0.42
2:B:456:THR:HG21	2:B:501:ILE:HD12	2.01	0.42
2:B:349:LEU:HD11	2:B:389:LEU:HD21	2.00	0.42
2:B:466:ARG:NH1	8:B:801:HOH:O	2.34	0.42
2:D:471:ARG:NH1	8:D:806:HOH:O	2.52	0.42
1:A:117:THR:HA	1:A:120:LYS:HB2	2.01	0.42
2:D:454:CYS:HB2	2:D:520:ASP:O	2.19	0.42
2:D:397:LEU:HD23	2:D:397:LEU:HA	1.92	0.42
2:D:619:THR:HG22	2:D:621:CYS:H	1.84	0.42
2:B:393:LEU:HD22	2:B:601:ILE:HG12	2.01	0.42
2:B:426:VAL:HA	2:B:524:ARG:O	2.20	0.42
2:B:431:LYS:HE2	8:B:805:HOH:O	2.19	0.42
1:A:114:LYS:HE2	1:A:114:LYS:HB2	1.93	0.42
2:B:563:LEU:HD22	2:B:607:THR:HG21	2.01	0.42
2:D:342:LEU:HD21	2:D:367:ALA:HB2	2.02	0.42
2:D:585:ILE:HD13	2:D:603:MET:HB3	2.02	0.42
2:B:368:ASN:O	2:D:414:ARG:NH2	2.53	0.42
2:D:336:GLU:H	2:D:336:GLU:HG3	1.66	0.42
1:A:123:TYR:OH	1:A:127:ARG:HD2	2.20	0.41
1:C:25:GLU:O	1:C:29:ASN:ND2	2.43	0.41
2:B:336:GLU:H	2:B:336:GLU:HG3	1.63	0.41
2:D:443:LEU:HD23	2:D:447:PHE:O	2.20	0.41
2:D:595:ASP:OD2	2:D:637:LYS:HE2	2.20	0.41
1:A:101:GLN:OE1	1:A:180:LYS:HB2	2.20	0.41
1:C:138:ASP:OD1	1:C:192:SER:HB3	2.21	0.41
1:C:278:HIS:NE2	7:C:506:AMP:H2'	2.36	0.41
1:A:167:ASP:HA	1:A:168:PRO:HD2	1.89	0.41
2:D:423:PHE:CD1	2:D:435:LEU:HD12	2.56	0.41
2:B:358:ILE:HD12	2:B:605:TYR:CD2	2.56	0.41
2:B:397:LEU:HD12	2:B:632:VAL:HG23	2.02	0.41
2:B:570:LEU:HD23	2:B:570:LEU:HA	1.89	0.41
2:D:481:HIS:CG	2:D:486:MET:HG3	2.56	0.41
2:D:593:ILE:H	2:D:593:ILE:HG13	1.78	0.40
2:B:352:LYS:NZ	2:B:638:ALA:HB2	2.36	0.40
2:D:491:GLU:HG2	2:D:492:LYS:N	2.31	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:80:PHE:HE2	1:A:288:GLN:HE21	1.69	0.40
1:C:149:LYS:HG3	1:C:159:PHE:CE2	2.56	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	261/442 (59%)	259 (99%)	2 (1%)	0	100	100
1	C	261/442 (59%)	260 (100%)	1 (0%)	0	100	100
2	B	305/638 (48%)	293 (96%)	12 (4%)	0	100	100
2	D	305/638 (48%)	293 (96%)	12 (4%)	0	100	100
All	All	1132/2160 (52%)	1105 (98%)	27 (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	221/373 (59%)	205 (93%)	16 (7%)	13	44
1	C	221/373 (59%)	209 (95%)	12 (5%)	20	53
2	B	252/533 (47%)	237 (94%)	15 (6%)	17	50

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	D	252/533 (47%)	238 (94%)	14 (6%)	19	52
All	All	946/1812 (52%)	889 (94%)	57 (6%)	17	50

All (57) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	35	VAL
1	A	37	THR
1	A	41	GLU
1	A	87	VAL
1	A	97	THR
1	A	98	LYS
1	A	101	GLN
1	A	132	THR
1	A	153	THR
1	A	154	LYS
1	A	197	GLN
1	A	200	SER
1	A	206	LEU
1	A	221	MET
1	A	240	VAL
1	A	288	GLN
2	B	336	GLU
2	B	341	VAL
2	B	342	LEU
2	B	362	LEU
2	B	385	VAL
2	B	401	ARG
2	B	402	ARG
2	B	410	MET
2	B	449	VAL
2	B	487	VAL
2	B	491	GLU
2	B	510	ARG
2	B	555	VAL
2	B	595	ASP
2	B	606	ILE
1	C	35	VAL
1	C	37	THR
1	C	41	GLU
1	C	87	VAL
1	C	97	THR

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Mol	Chain	Res	Type
1	C	98	LYS
1	C	153	THR
1	C	197	GLN
1	C	206	LEU
1	C	221	MET
1	C	240	VAL
1	C	288	GLN
2	D	341	VAL
2	D	342	LEU
2	D	362	LEU
2	D	382	THR
2	D	385	VAL
2	D	410	MET
2	D	449	VAL
2	D	466	ARG
2	D	487	VAL
2	D	491	GLU
2	D	575	MET
2	D	580	ARG
2	D	606	ILE
2	D	637	LYS

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

Mol	Chain	Res	Type
1	A	24	ASN
2	B	400	GLN
1	C	77	HIS
1	C	126	GLN
1	C	216	ASN

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 [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 23 ligands modelled in this entry, 4 are monoatomic - leaving 19 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	SO4	D	701	-	4,4,4	0.22	0	6,6,6	0.14	0
4	GNP	D	703	5	34,34,34	1.77	7 (20%)	47,54,54	0.90	3 (6%)
3	SO4	C	501	-	4,4,4	0.26	0	6,6,6	0.17	0
3	SO4	B	704	-	4,4,4	0.25	0	6,6,6	0.16	0
3	SO4	D	702	-	4,4,4	0.25	0	6,6,6	0.15	0
3	SO4	B	702	-	4,4,4	0.22	0	6,6,6	0.18	0
6	GOL	A	504	-	5,5,5	0.43	0	5,5,5	0.60	0
3	SO4	B	703	-	4,4,4	0.28	0	6,6,6	0.15	0
6	GOL	B	707	-	5,5,5	0.32	0	5,5,5	0.82	0
6	GOL	C	505	-	5,5,5	0.40	0	5,5,5	0.23	0
6	GOL	D	705	-	5,5,5	0.35	0	5,5,5	0.43	0
3	SO4	A	501	-	4,4,4	0.22	0	6,6,6	0.23	0
4	GNP	C	503	5	34,34,34	1.82	5 (14%)	47,54,54	1.14	3 (6%)
3	SO4	B	701	-	4,4,4	0.20	0	6,6,6	0.18	0
4	GNP	B	705	5	34,34,34	1.59	5 (14%)	47,54,54	1.07	3 (6%)
3	SO4	C	502	-	4,4,4	0.24	0	6,6,6	0.21	0
7	AMP	A	505	-	25,25,25	1.44	4 (16%)	37,38,38	1.82	9 (24%)
4	GNP	A	502	5	34,34,34	1.57	5 (14%)	47,54,54	1.61	7 (14%)
7	AMP	C	506	-	25,25,25	1.49	3 (12%)	37,38,38	1.85	8 (21%)

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
4	GNP	C	503	5	-	5/18/38/38	0/3/3/3
4	GNP	D	703	5	-	3/18/38/38	0/3/3/3
6	GOL	B	707	-	-	2/4/4/4	-
6	GOL	C	505	-	-	0/4/4/4	-
6	GOL	D	705	-	-	3/4/4/4	-
7	AMP	A	505	-	-	6/10/26/26	0/3/3/3
4	GNP	B	705	5	-	7/18/38/38	0/3/3/3
4	GNP	A	502	5	-	1/18/38/38	0/3/3/3
7	AMP	C	506	-	-	6/10/26/26	0/3/3/3
6	GOL	A	504	-	-	3/4/4/4	-

All (29) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	503	GNP	PA-O3A	-6.21	1.52	1.59
4	D	703	GNP	PA-O3A	-5.89	1.53	1.59
4	C	503	GNP	PB-O3A	-5.26	1.52	1.59
7	C	506	AMP	C5-C4	5.26	1.48	1.39
4	A	502	GNP	PA-O3A	-5.11	1.54	1.59
4	B	705	GNP	PA-O3A	-5.08	1.54	1.59
7	A	505	AMP	C5-C4	4.90	1.47	1.39
4	D	703	GNP	PB-O3A	-4.64	1.53	1.59
4	A	502	GNP	PB-O3A	-4.01	1.54	1.59
4	B	705	GNP	PB-O3A	-3.95	1.54	1.59
4	C	503	GNP	PG-O1G	3.69	1.51	1.46
4	A	502	GNP	PG-O1G	3.61	1.51	1.46
4	D	703	GNP	PG-O1G	3.46	1.51	1.46
4	D	703	GNP	PB-O2B	-3.39	1.47	1.56
4	C	503	GNP	PB-O2B	-3.39	1.47	1.56
4	B	705	GNP	PG-O1G	3.15	1.51	1.46
4	B	705	GNP	PB-O2B	-3.15	1.48	1.56
4	A	502	GNP	PB-O2B	-3.15	1.48	1.56
7	C	506	AMP	C5-C6	3.12	1.49	1.41
7	A	505	AMP	C5-C6	2.89	1.49	1.41
7	C	506	AMP	C8-N7	2.67	1.36	1.31
7	A	505	AMP	C8-N7	2.50	1.36	1.31
4	B	705	GNP	PG-O3G	-2.34	1.50	1.56
4	D	703	GNP	PG-O3G	-2.18	1.51	1.56
4	C	503	GNP	PG-O2G	-2.14	1.51	1.56
7	A	505	AMP	C5-N7	-2.11	1.35	1.39
4	A	502	GNP	PG-O3G	-2.09	1.51	1.56

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	703	GNP	PG-O2G	-2.08	1.51	1.56
4	D	703	GNP	PG-N3B	-2.03	1.58	1.63

All (33) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	502	GNP	O1B-PB-N3B	-7.48	100.75	111.77
7	A	505	AMP	C5-C4-N3	-5.43	119.25	126.72
7	C	506	AMP	C5-C4-N3	-5.32	119.39	126.72
4	C	503	GNP	O1B-PB-N3B	-4.71	104.84	111.77
7	A	505	AMP	N3-C4-N9	4.03	134.01	127.17
7	C	506	AMP	C2-N3-C4	3.79	121.08	111.83
7	C	506	AMP	N3-C4-N9	3.75	133.54	127.17
7	C	506	AMP	C4-C5-N7	-3.70	106.35	110.58
7	C	506	AMP	N3-C2-N1	-3.70	122.98	128.58
7	A	505	AMP	C2-N3-C4	3.64	120.73	111.83
7	A	505	AMP	C4-C5-N7	-3.61	106.45	110.58
7	A	505	AMP	N3-C2-N1	-3.44	123.37	128.58
4	A	502	GNP	O3G-PG-O1G	-3.33	105.11	113.45
4	C	503	GNP	O2B-PB-O1B	3.30	116.95	109.87
4	B	705	GNP	O3G-PG-O1G	-3.29	105.20	113.45
4	D	703	GNP	O1B-PB-N3B	-3.13	107.17	111.77
4	B	705	GNP	O2B-PB-O1B	3.04	116.39	109.87
4	A	502	GNP	O2G-PG-O3G	2.98	115.59	107.59
4	A	502	GNP	O3A-PB-N3B	2.89	114.62	106.59
4	A	502	GNP	C3'-C2'-C1'	-2.81	96.16	101.46
4	B	705	GNP	O2G-PG-O3G	2.78	115.07	107.59
7	C	506	AMP	C6-C5-N7	2.75	137.38	132.09
4	D	703	GNP	O1G-PG-N3B	-2.72	107.77	111.77
4	A	502	GNP	O2B-PB-O1B	2.64	115.53	109.87
7	A	505	AMP	C5-N7-C8	2.61	107.56	103.45
4	D	703	GNP	O2B-PB-O1B	2.58	115.40	109.87
7	C	506	AMP	C5-N7-C8	2.51	107.39	103.45
7	A	505	AMP	C6-C5-N7	2.49	136.89	132.09
4	A	502	GNP	O4'-C1'-N9	-2.49	102.72	108.36
7	C	506	AMP	C2-N1-C6	2.47	122.78	118.73
4	C	503	GNP	O1G-PG-N3B	-2.44	108.17	111.77
7	A	505	AMP	C2-N1-C6	2.11	122.19	118.73
7	A	505	AMP	C4-N9-C8	2.02	107.86	105.74

There are no chirality outliers.

All (36) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	502	GNP	PG-N3B-PB-O1B
4	B	705	GNP	PG-N3B-PB-O1B
4	B	705	GNP	PG-N3B-PB-O3A
4	B	705	GNP	C5'-O5'-PA-O1A
4	B	705	GNP	C5'-O5'-PA-O2A
4	C	503	GNP	PB-N3B-PG-O1G
4	C	503	GNP	PG-N3B-PB-O1B
4	C	503	GNP	PG-N3B-PB-O3A
4	D	703	GNP	PG-N3B-PB-O1B
4	D	703	GNP	PG-N3B-PB-O3A
6	B	707	GOL	O1-C1-C2-C3
6	D	705	GOL	O1-C1-C2-C3
4	B	705	GNP	C3'-C4'-C5'-O5'
6	D	705	GOL	O1-C1-C2-O2
4	B	705	GNP	O4'-C4'-C5'-O5'
7	A	505	AMP	O4'-C4'-C5'-O5'
7	A	505	AMP	C3'-C4'-C5'-O5'
6	A	504	GOL	O1-C1-C2-C3
6	B	707	GOL	O1-C1-C2-O2
7	C	506	AMP	O4'-C4'-C5'-O5'
6	A	504	GOL	O1-C1-C2-O2
6	D	705	GOL	O2-C2-C3-O3
7	A	505	AMP	O4'-C1'-N9-C8
7	A	505	AMP	C2'-C1'-N9-C8
7	C	506	AMP	C2'-C1'-N9-C8
4	B	705	GNP	C5'-O5'-PA-O3A
7	C	506	AMP	C3'-C4'-C5'-O5'
7	C	506	AMP	O4'-C1'-N9-C8
7	A	505	AMP	O4'-C1'-N9-C4
7	C	506	AMP	O4'-C1'-N9-C4
4	C	503	GNP	C3'-C4'-C5'-O5'
6	A	504	GOL	O2-C2-C3-O3
7	A	505	AMP	C2'-C1'-N9-C4
7	C	506	AMP	C2'-C1'-N9-C4
4	D	703	GNP	PA-O3A-PB-O1B
4	C	503	GNP	O4'-C4'-C5'-O5'

There are no ring outliers.

7 monomers are involved in 11 short contacts:

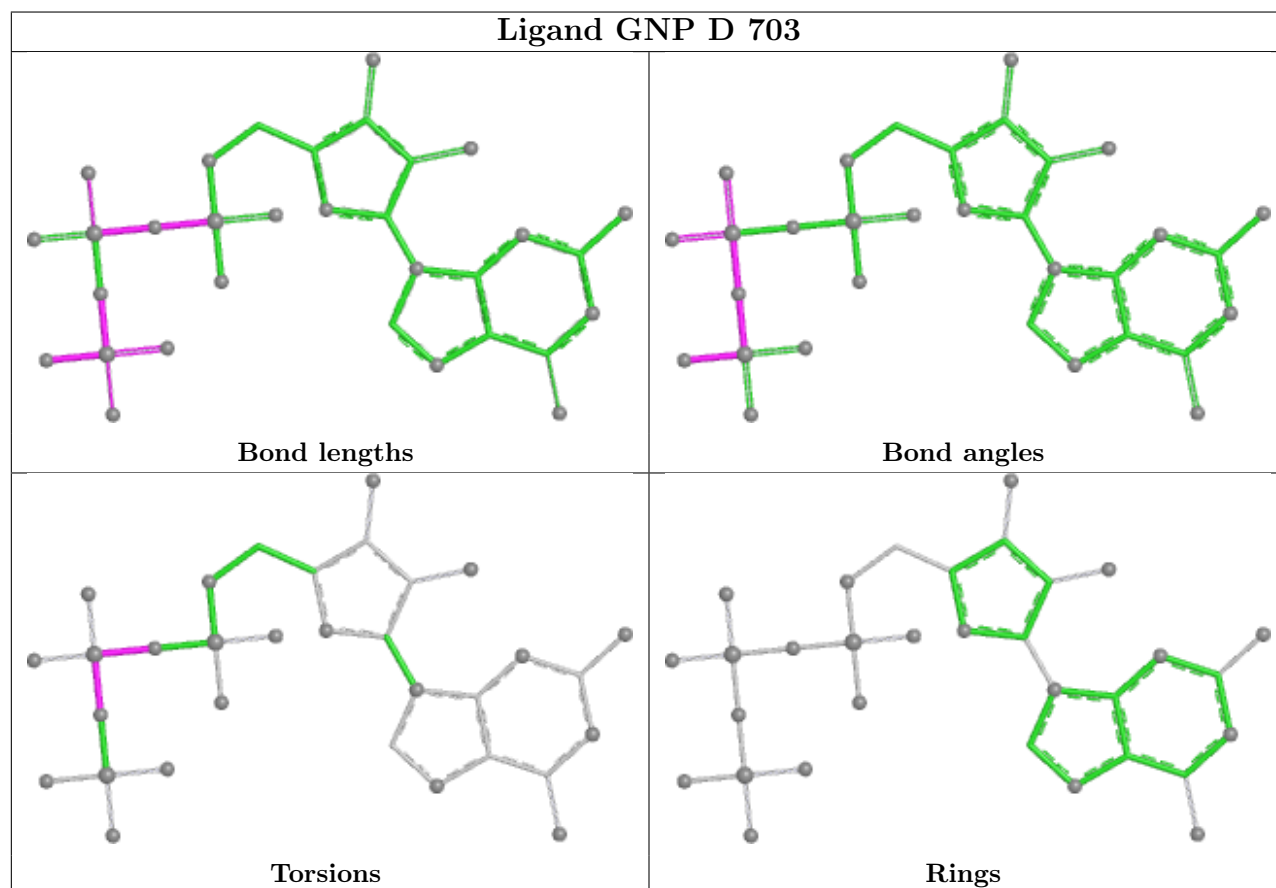
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	702	SO4	1	0
6	A	504	GOL	2	0

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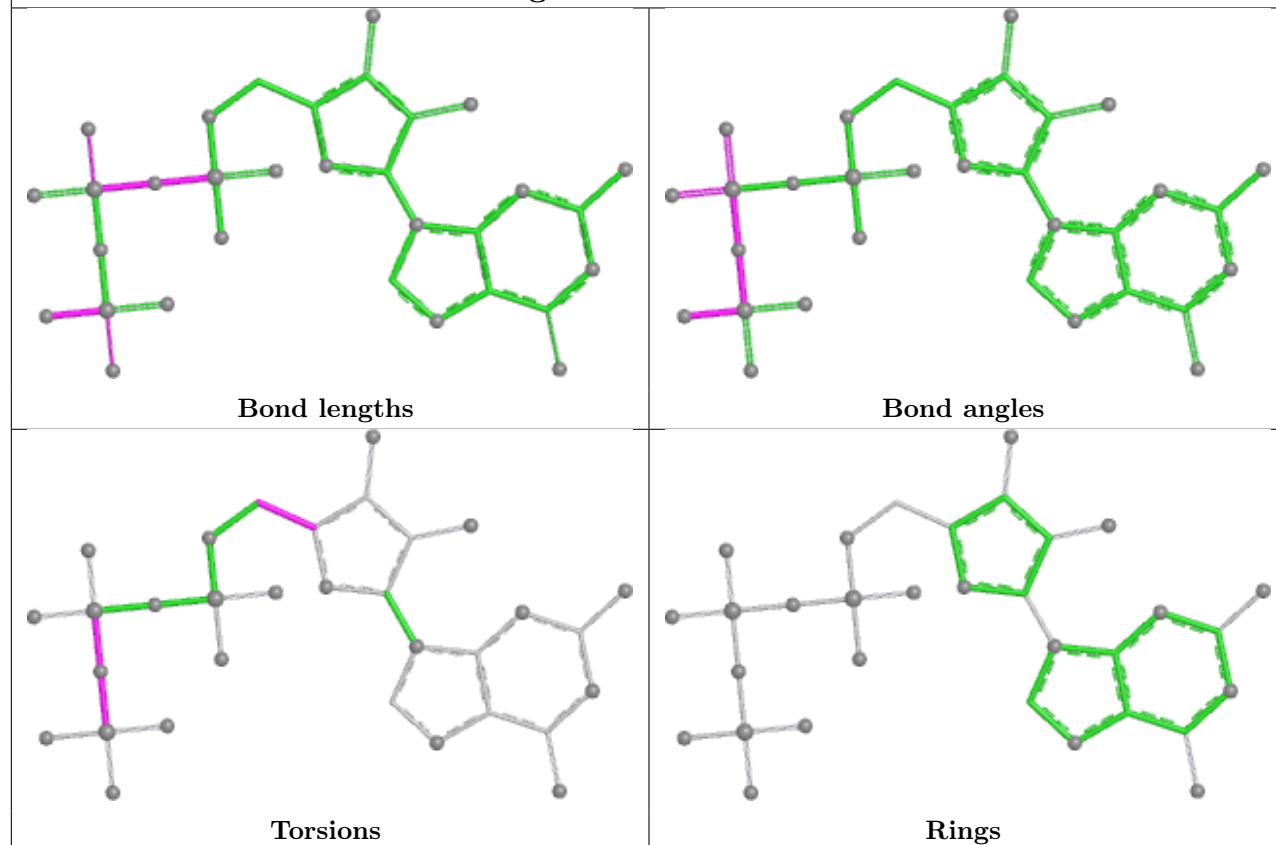
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	D	705	GOL	2	0
3	A	501	SO4	1	0
7	A	505	AMP	2	0
4	A	502	GNP	1	0
7	C	506	AMP	2	0

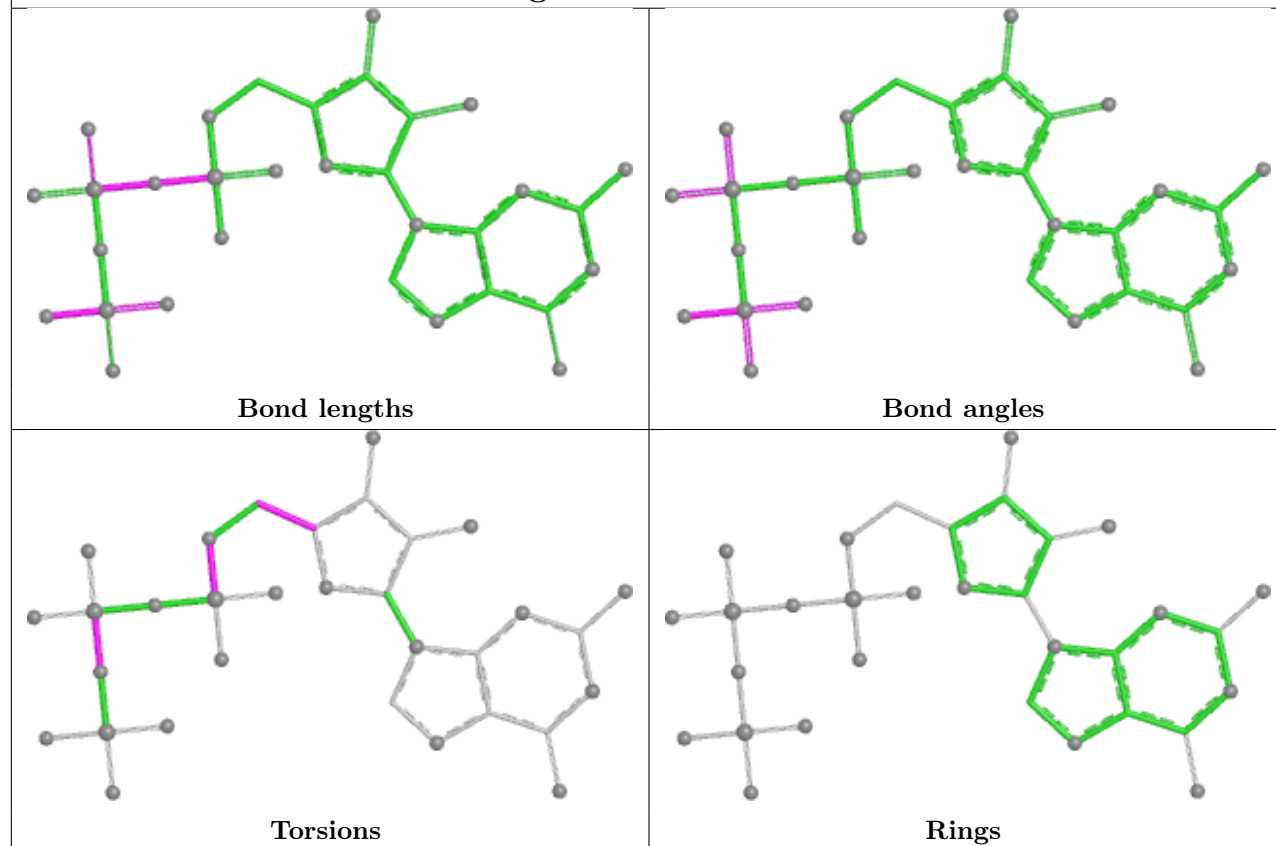
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.



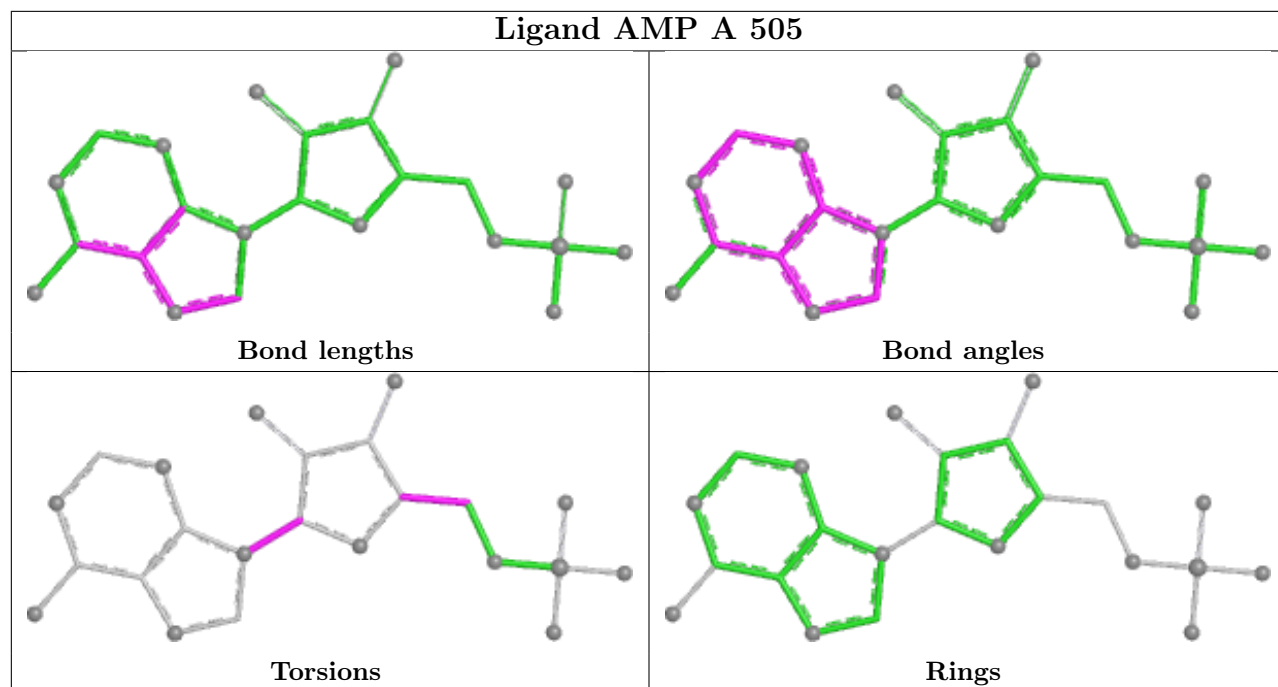
Ligand GNP C 503



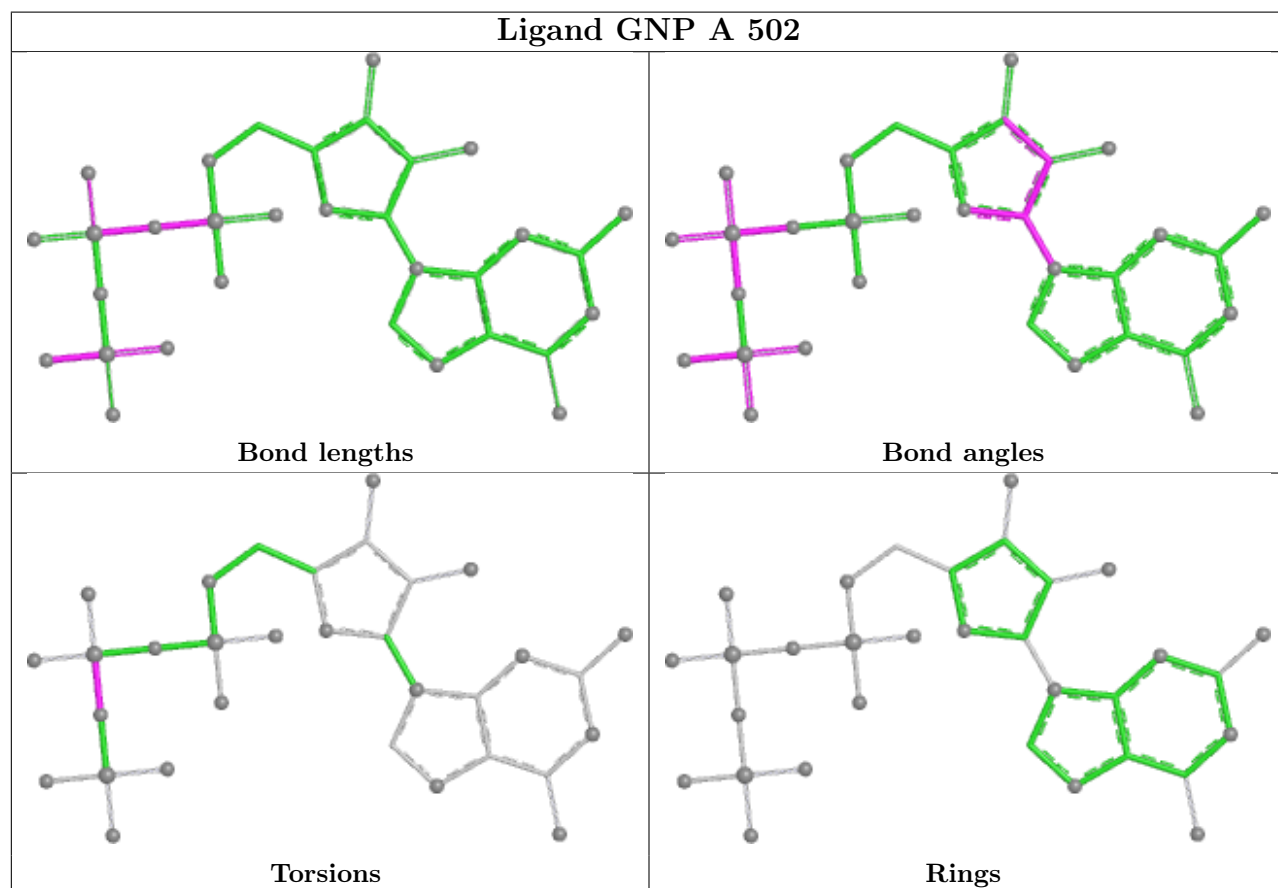
Ligand GNP B 705

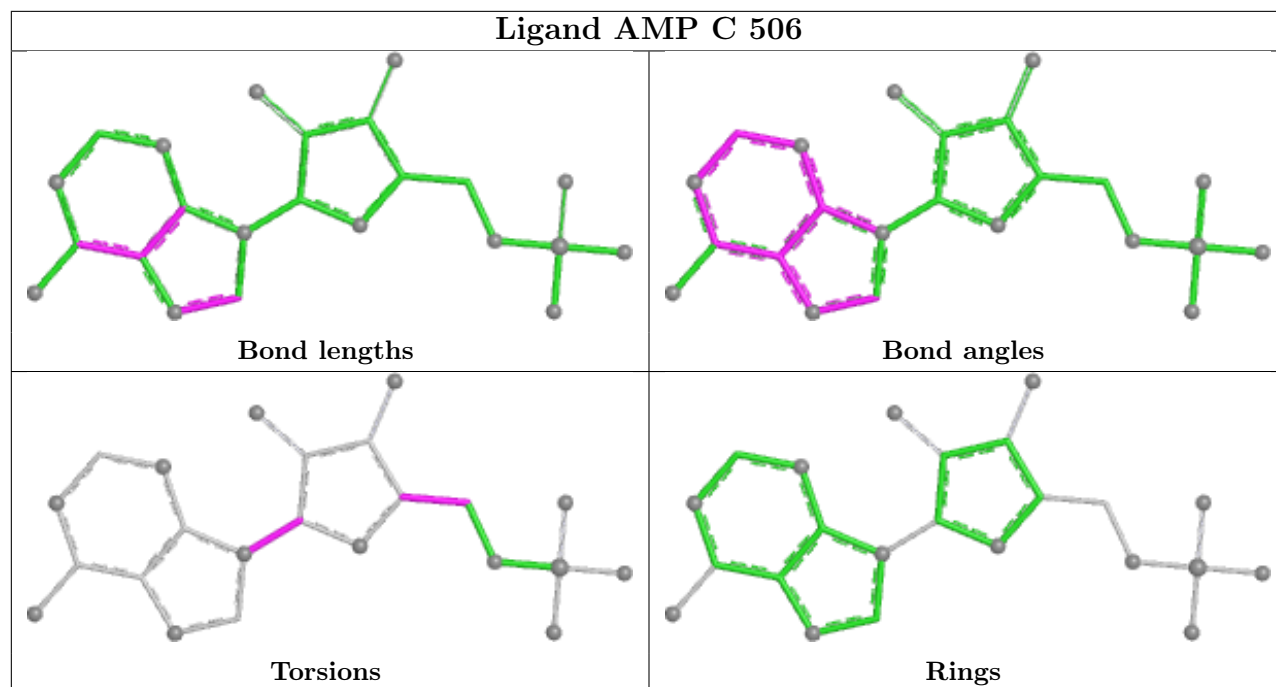


Ligand AMP A 505



Ligand GNP A 502





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	265/442 (59%)	-0.36	7 (2%) 57 37	35, 54, 115, 151	0
1	C	265/442 (59%)	-0.23	7 (2%) 57 37	49, 72, 123, 163	0
2	B	307/638 (48%)	-0.61	1 (0%) 90 81	31, 49, 86, 126	0
2	D	307/638 (48%)	-0.55	0 100 100	31, 49, 91, 122	0
All	All	1144/2160 (52%)	-0.45	15 (1%) 75 55	31, 55, 106, 163	0

All (15) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	296	GLY	3.9
1	C	71	LYS	3.8
1	C	27	VAL	3.5
1	C	70	ASN	3.3
2	B	575	MET	2.7
1	A	71	LYS	2.7
1	A	27	VAL	2.6
1	A	296	GLY	2.6
1	C	73	LYS	2.4
1	C	31	MET	2.3
1	A	75	ILE	2.3
1	C	74	MET	2.3
1	A	61	ASP	2.3
1	A	101	GLN	2.1
1	A	74	MET	2.1

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 oligosaccharides in this entry.

6.4 Ligands ⓘ

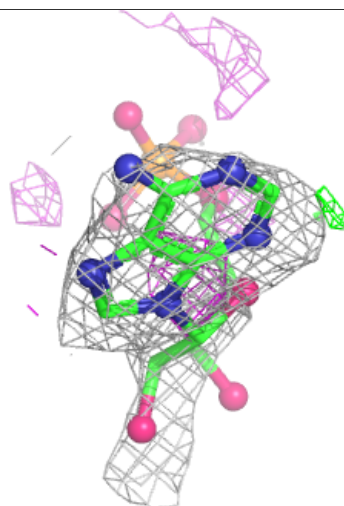
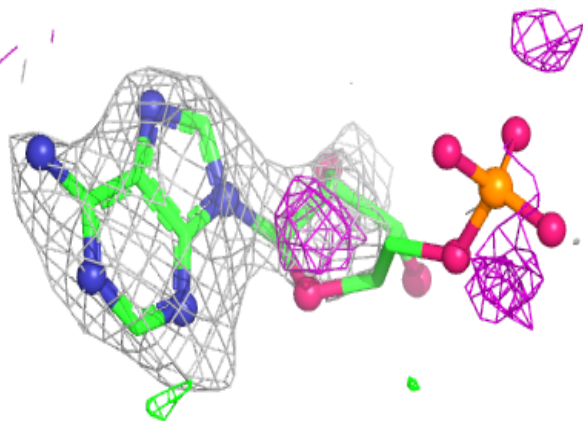
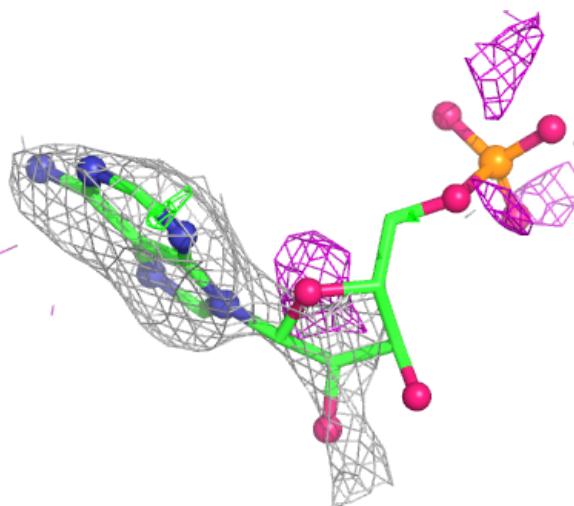
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
6	GOL	C	505	6/6	0.58	0.23	107,108,110,110	0
3	SO4	B	701	5/5	0.73	0.10	157,157,157,157	0
3	SO4	B	702	5/5	0.74	0.10	155,156,156,156	0
3	SO4	C	501	5/5	0.75	0.11	151,152,152,152	0
7	AMP	C	506	23/23	0.76	0.18	55,90,168,169	23
6	GOL	A	504	6/6	0.77	0.16	95,98,99,99	0
7	AMP	A	505	23/23	0.81	0.17	55,78,192,192	23
3	SO4	A	501	5/5	0.85	0.12	165,165,165,166	0
3	SO4	C	502	5/5	0.85	0.11	155,155,156,156	0
3	SO4	D	701	5/5	0.85	0.25	135,135,136,137	0
3	SO4	D	702	5/5	0.85	0.07	147,148,148,149	0
3	SO4	B	703	5/5	0.87	0.21	131,133,133,134	0
6	GOL	B	707	6/6	0.91	0.29	99,101,101,102	0
3	SO4	B	704	5/5	0.94	0.11	180,180,181,181	0
6	GOL	D	705	6/6	0.96	0.28	110,111,112,113	0
4	GNP	B	705	32/32	0.99	0.03	26,36,42,55	0
4	GNP	C	503	32/32	0.99	0.04	33,45,49,53	0
4	GNP	D	703	32/32	0.99	0.04	22,36,42,57	0
5	MG	C	504	1/1	0.99	0.10	40,40,40,40	0
4	GNP	A	502	32/32	0.99	0.04	27,37,43,47	0
5	MG	B	706	1/1	1.00	0.02	28,28,28,28	0
5	MG	A	503	1/1	1.00	0.02	30,30,30,30	0
5	MG	D	704	1/1	1.00	0.04	24,24,24,24	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.

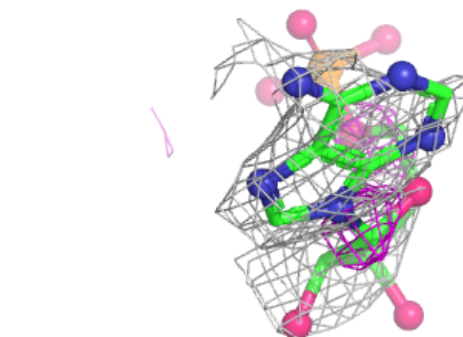
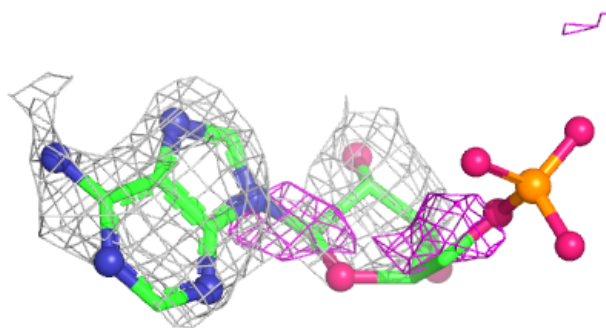
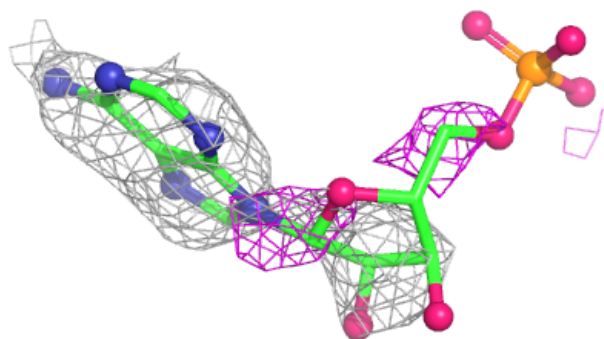
Electron density around AMP C 506:

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

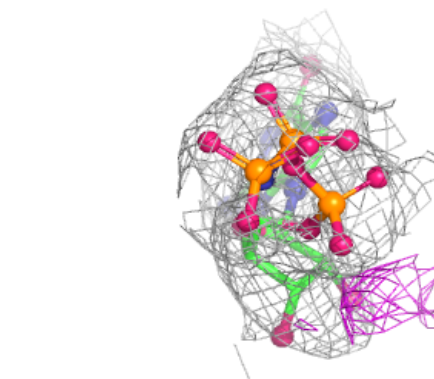
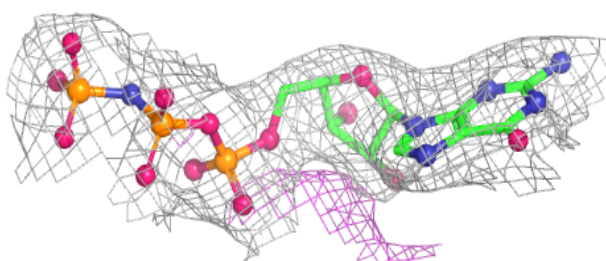
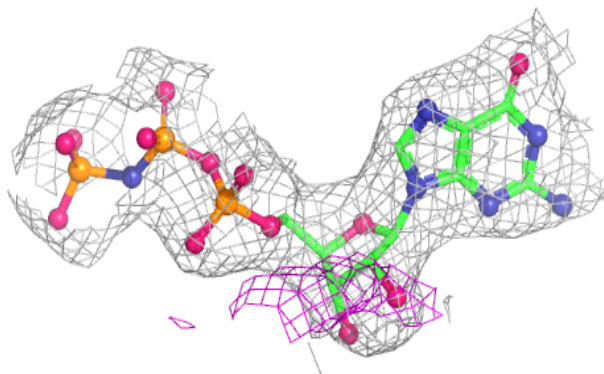


Electron density around AMP A 505:

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

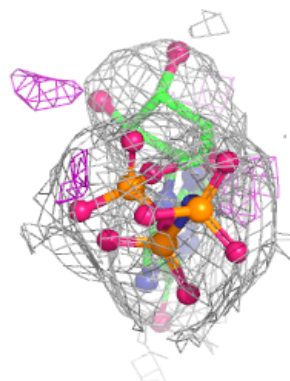
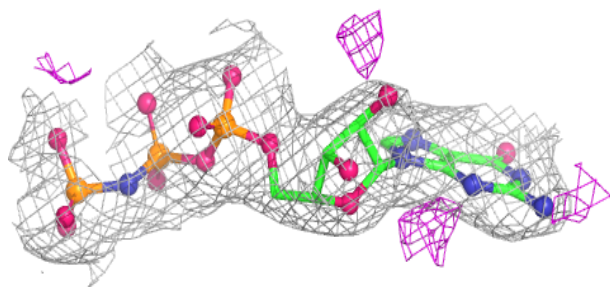
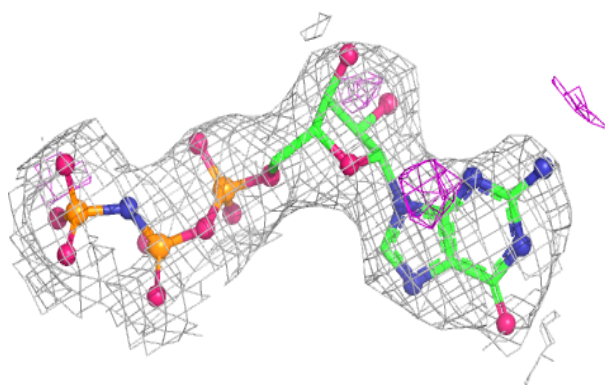
**Electron density around GNP B 705:**

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

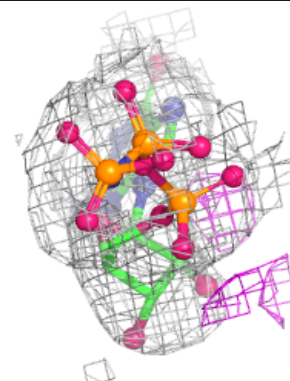
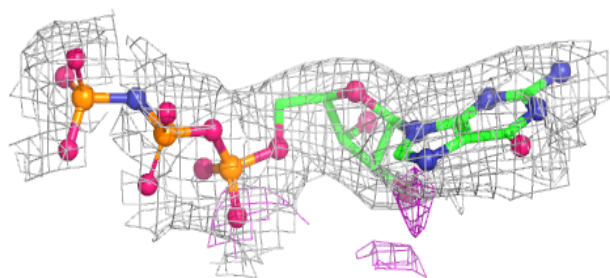
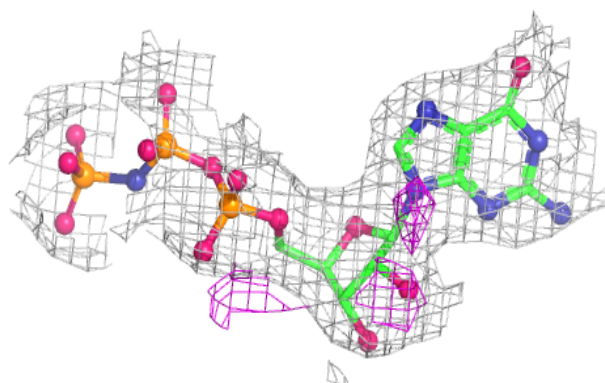


Electron density around GNP C 503:

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

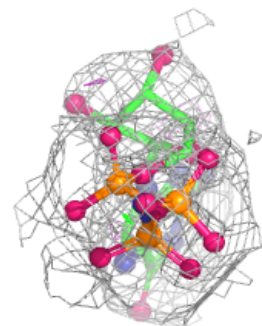
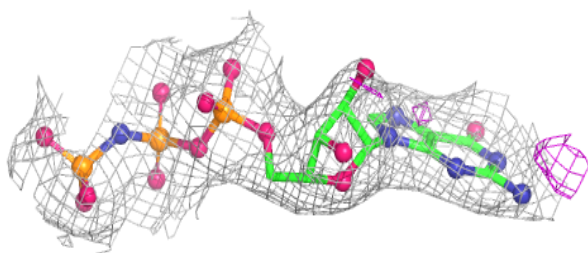
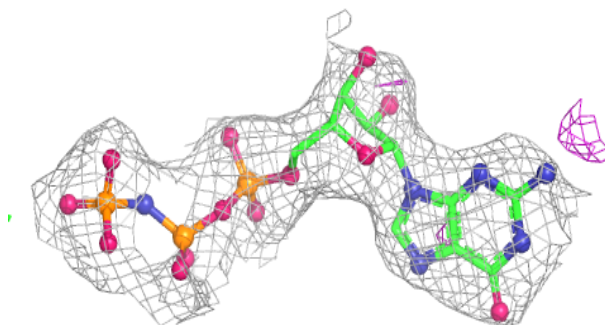
**Electron density around GNP D 703:**

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



Electron density around GNP A 502:

$2mF_o-DF_c$ (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.