



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 21, 2020 – 09:33 PM BST

PDB ID : 6ULY  
Title : Adenylation domain of a keto acid-selecting NRPS module bound to keto acyl adenylyate space group P212121  
Authors : Alonzo, D.A.; Chiche-Lapierre, C.; Schmeing, T.M.  
Deposited on : 2019-10-08  
Resolution : 2.30 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto: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.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.13.1  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.13.1

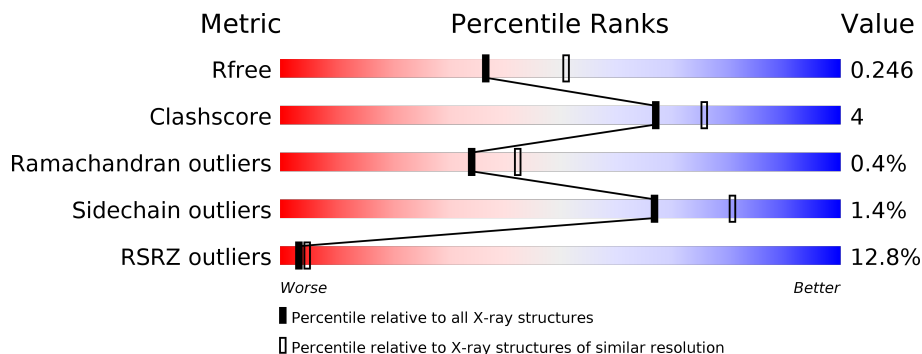
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.30 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	576	 10% 86% 8% 5%
1	B	576	 14% 83% 9% 8%

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 16777 atoms, of which 8101 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 Amino acid adenylation domain-containing protein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	545	8312	2696	4072	730	794	20	0	0	0
1	B	531	8122	2640	3979	708	775	20	0	1	0

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	650	ALA	-	expression tag	UNP M5R382
A	651	ALA	-	expression tag	UNP M5R382
A	652	ALA	-	expression tag	UNP M5R382
A	653	GLU	-	expression tag	UNP M5R382
A	654	ASN	-	expression tag	UNP M5R382
A	655	LEU	-	expression tag	UNP M5R382
A	656	TYR	-	expression tag	UNP M5R382
A	657	PHE	-	expression tag	UNP M5R382
A	658	GLN	-	expression tag	UNP M5R382
B	650	ALA	-	expression tag	UNP M5R382
B	651	ALA	-	expression tag	UNP M5R382
B	652	ALA	-	expression tag	UNP M5R382
B	653	GLU	-	expression tag	UNP M5R382
B	654	ASN	-	expression tag	UNP M5R382
B	655	LEU	-	expression tag	UNP M5R382
B	656	TYR	-	expression tag	UNP M5R382
B	657	PHE	-	expression tag	UNP M5R382
B	658	GLN	-	expression tag	UNP M5R382

- Molecule 2 is 5'-O-[(S)-hydroxy[(4-methyl-2-oxopentanoyl)oxy]phosphoryl]adenosine (three-letter code: QA7) (formula: C<sub>16</sub>H<sub>22</sub>N<sub>5</sub>O<sub>9</sub>P) (labeled as "Ligand of Interest" by author).



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

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	B	1	Total	C	H	O	0	0
			14	3	8	3		

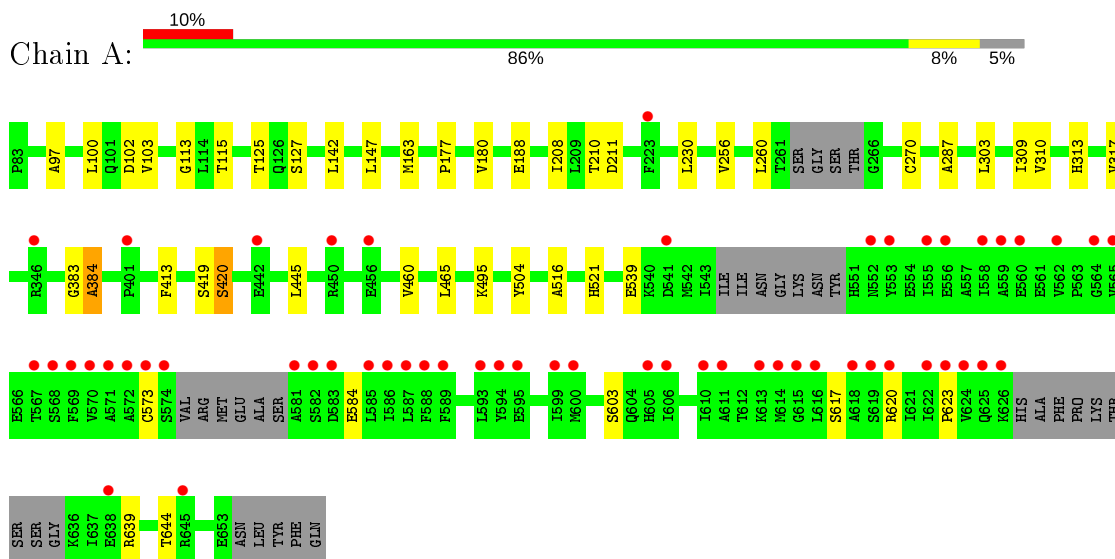
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	55	Total	O	0	0
			55	55		
5	B	65	Total	O	0	0
			65	65		

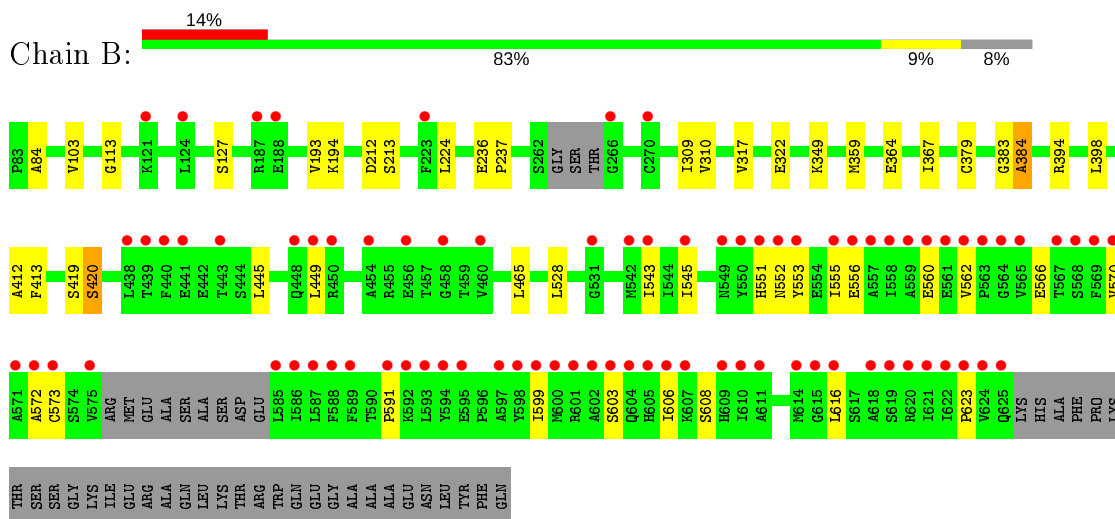
### 3 Residue-property plots [i](#)

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: Amino acid adenylation domain-containing protein



- Molecule 1: Amino acid adenylation domain-containing protein



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	99.91Å 107.03Å 168.04Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	66.98 – 2.30 66.98 – 2.30	Depositor EDS
% Data completeness (in resolution range)	99.3 (66.98-2.30) 99.3 (66.98-2.30)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.41 (at 2.29Å)	Xtrriage
Refinement program	PHENIX 1.15.2_3472	Depositor
R, $R_{free}$	0.228 , 0.247 0.228 , 0.246	Depositor DCC
$R_{free}$ test set	1219 reflections (1.52%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	39.5	Xtrriage
Anisotropy	0.932	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.42 , 44.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	16777	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	69.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.91% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.



## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, QA7, SO4

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.33	0/4337	0.48	0/5891
1	B	0.35	0/4242	0.49	0/5768
All	All	0.34	0/8579	0.48	0/11659

There are no bond length outliers.

There are no bond angle outliers.

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	4240	4072	4146	28	0
1	B	4143	3979	4054	37	0
2	A	31	21	0	0	0
2	B	31	21	0	1	0
3	A	65	0	0	1	0
3	B	40	0	0	0	0
4	B	6	8	8	1	0
5	A	55	0	0	2	0
5	B	65	0	0	1	0
All	All	8676	8101	8208	65	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 4.

All (65) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:545:ILE:HB	1:B:616:LEU:HD21	1.47	0.96
1:B:545:ILE:HD13	1:B:616:LEU:HD21	1.48	0.94
1:B:367:ILE:HD13	1:B:398:LEU:HD21	1.60	0.82
1:B:545:ILE:CD1	1:B:616:LEU:HD21	2.10	0.82
1:B:545:ILE:HB	1:B:616:LEU:CD2	2.11	0.80
1:B:364:GLU:OE1	1:B:394:ARG:NH2	2.22	0.73
1:B:545:ILE:HD13	1:B:616:LEU:CD2	2.23	0.69
1:B:367:ILE:CD1	1:B:398:LEU:HD21	2.22	0.69
1:B:543:ILE:HD13	1:B:555:ILE:CD1	2.24	0.68
1:A:516:ALA:HB2	4:B:701:GOL:H12	1.75	0.68
1:B:545:ILE:CB	1:B:616:LEU:HD21	2.24	0.62
1:A:208:ILE:HD12	1:A:230:LEU:HD11	1.83	0.60
1:B:367:ILE:HD13	1:B:398:LEU:CD2	2.31	0.59
1:A:115:THR:HG23	1:A:125:THR:HG22	1.84	0.58
1:B:603:SER:OG	1:B:623:PRO:CG	2.53	0.56
1:A:617:SER:OG	1:A:620:ARG:NE	2.39	0.55
1:A:309:ILE:HG23	1:A:310:VAL:HG23	1.89	0.54
1:B:309:ILE:HG23	1:B:310:VAL:HG23	1.90	0.53
1:A:103:VAL:HG12	1:A:317:VAL:HG12	1.91	0.53
1:A:210:THR:OG1	1:A:211:ASP:N	2.43	0.52
1:A:584:GLU:OE1	1:A:620:ARG:HA	2.10	0.52
1:B:551:HIS:HB3	1:B:553:TYR:CE2	2.43	0.52
1:A:603:SER:HB3	1:A:623:PRO:CG	2.39	0.51
1:A:584:GLU:CD	1:A:620:ARG:HA	2.30	0.51
1:A:521:HIS:NE2	1:A:539:GLU:OE2	2.42	0.51
1:A:383:GLY:O	1:A:384:ALA:CB	2.60	0.49
1:B:543:ILE:HG13	1:B:572:ALA:HB2	1.95	0.48
1:B:367:ILE:HG21	1:B:398:LEU:HD21	1.94	0.48
1:B:193:VAL:HG11	1:B:224:LEU:HD23	1.95	0.47
1:B:383:GLY:O	1:B:384:ALA:HB3	2.14	0.47
1:B:367:ILE:HG21	1:B:398:LEU:CD2	2.44	0.47
1:B:84:ALA:C	1:B:528:LEU:HD12	2.35	0.47
3:A:709:SO4:O2	1:B:194:LYS:NZ	2.48	0.46
1:B:236:GLU:HB2	1:B:237:PRO:HD3	1.96	0.46
1:B:383:GLY:O	1:B:384:ALA:CB	2.63	0.46
1:B:545:ILE:CG1	1:B:616:LEU:HD21	2.46	0.46
1:B:445:LEU:HB2	1:B:553:TYR:CD1	2.50	0.46
1:A:97:ALA:HB1	1:A:102:ASP:HB2	1.97	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:445:LEU:HD23	1:B:449:LEU:CD2	2.46	0.45
1:B:349:LYS:HA	1:B:379:CYS:O	2.17	0.45
1:A:603:SER:HB3	1:A:623:PRO:HG3	1.98	0.44
1:B:552:ASN:O	1:B:556:GLU:HG3	2.16	0.44
1:A:163:MET:HE3	1:A:303:LEU:HD12	1.99	0.44
1:A:270:CYS:HB3	1:A:504:TYR:HB3	1.99	0.43
1:B:322:GLU:HG3	5:B:806:HOH:O	2.17	0.43
1:A:419:SER:O	1:A:420:SER:CB	2.66	0.43
1:A:287:ALA:HB2	5:A:825:HOH:O	2.19	0.42
1:B:562:VAL:HG21	1:B:606:ILE:HA	2.01	0.42
1:A:180:VAL:HB	1:A:260:LEU:HD22	2.00	0.42
1:B:419:SER:O	1:B:420:SER:CB	2.68	0.42
1:A:313:HIS:O	1:A:317:VAL:HG23	2.20	0.42
1:B:113:GLY:HA3	1:B:127:SER:HA	2.02	0.41
1:B:412:ALA:O	2:B:702:QA7:N24	2.53	0.41
1:A:100:LEU:HD12	1:A:256:VAL:HG21	2.02	0.41
1:A:383:GLY:O	1:A:384:ALA:HB3	2.20	0.41
1:B:413:PHE:HB2	1:B:465:LEU:HD13	2.03	0.41
1:A:142:LEU:HB3	1:A:147:LEU:HD22	2.03	0.41
1:A:445:LEU:HD21	1:A:460:VAL:HG21	2.03	0.41
1:A:413:PHE:HB2	1:A:465:LEU:HD13	2.02	0.41
1:B:591:PRO:HG3	1:B:599:ILE:HG12	2.02	0.41
1:A:495:LYS:NZ	5:A:809:HOH:O	2.54	0.41
1:B:552:ASN:OD1	1:B:553:TYR:N	2.54	0.41
1:A:113:GLY:HA3	1:A:127:SER:HA	2.03	0.40
1:A:177:PRO:HD2	1:A:256:VAL:O	2.20	0.40
1:B:103:VAL:HG12	1:B:317:VAL:HG12	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	535/576 (93%)	520 (97%)	13 (2%)	2 (0%)	34	42
1	B	526/576 (91%)	513 (98%)	11 (2%)	2 (0%)	34	42
All	All	1061/1152 (92%)	1033 (97%)	24 (2%)	4 (0%)	34	42

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	420	SER
1	B	420	SER
1	A	384	ALA
1	B	384	ALA

### 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	447/478 (94%)	443 (99%)	4 (1%)	78	89
1	B	441/478 (92%)	433 (98%)	8 (2%)	59	75
All	All	888/956 (93%)	876 (99%)	12 (1%)	67	81

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	188	GLU
1	A	573	CYS
1	A	639	ARG
1	A	644	THR
1	B	212	ASP
1	B	213	SER
1	B	359	MET
1	B	560	GLU
1	B	566	GLU
1	B	570	VAL
1	B	573	CYS
1	B	608	SER

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

24 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
3	SO4	A	702	-	4,4,4	0.43	0	6,6,6	0.14	0
3	SO4	A	708	-	4,4,4	0.29	0	6,6,6	0.14	0
3	SO4	A	705	-	4,4,4	0.41	0	6,6,6	0.29	0
2	QA7	B	702	-	29,33,33	4.01	16 (55%)	31,49,49	1.44	3 (9%)
3	SO4	A	713	-	4,4,4	0.44	0	6,6,6	0.05	0
3	SO4	B	707	-	4,4,4	0.33	0	6,6,6	0.13	0
3	SO4	B	708	-	4,4,4	1.33	0	6,6,6	0.29	0
3	SO4	B	709	-	4,4,4	0.70	0	6,6,6	0.31	0
3	SO4	A	714	-	4,4,4	0.78	0	6,6,6	0.24	0
3	SO4	B	703	-	4,4,4	0.31	0	6,6,6	0.15	0
3	SO4	A	710	-	4,4,4	0.72	0	6,6,6	0.14	0
3	SO4	B	704	-	4,4,4	0.31	0	6,6,6	0.22	0
3	SO4	A	711	-	4,4,4	0.45	0	6,6,6	0.06	0
3	SO4	B	705	-	4,4,4	0.32	0	6,6,6	0.12	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	SO4	A	712	-	4,4,4	0.41	0	6,6,6	0.05	0
3	SO4	B	706	-	4,4,4	0.24	0	6,6,6	0.10	0
3	SO4	A	706	-	4,4,4	0.39	0	6,6,6	0.28	0
3	SO4	A	709	-	4,4,4	0.36	0	6,6,6	0.13	0
2	QA7	A	701	-	29,33,33	3.88	15 (51%)	31,49,49	1.81	6 (19%)
3	SO4	A	707	-	4,4,4	0.33	0	6,6,6	0.12	0
3	SO4	B	710	-	4,4,4	1.02	0	6,6,6	0.40	0
4	GOL	B	701	-	5,5,5	0.28	0	5,5,5	0.44	0
3	SO4	A	703	-	4,4,4	0.47	0	6,6,6	0.05	0
3	SO4	A	704	-	4,4,4	0.45	0	6,6,6	0.04	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GOL	B	701	-	-	2/4/4/4	-
2	QA7	B	702	-	-	3/19/39/39	0/3/3/3
2	QA7	A	701	-	-	4/19/39/39	0/3/3/3

All (31) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	702	QA7	O25-C14	-11.34	1.25	1.41
2	A	701	QA7	C13-C12	-11.15	1.22	1.53
2	B	702	QA7	C13-C12	-11.10	1.23	1.53
2	A	701	QA7	O25-C14	-10.83	1.26	1.41
2	B	702	QA7	C13-C14	8.96	1.67	1.53
2	A	701	QA7	C13-C14	7.48	1.65	1.53
2	B	702	QA7	C10-C11	-4.60	1.37	1.51
2	A	701	QA7	O31-C05	-4.55	1.13	1.23
2	A	701	QA7	C10-C11	-4.37	1.38	1.51
2	B	702	QA7	O27-C12	4.19	1.52	1.43
2	A	701	QA7	O30-C06	-4.05	1.13	1.21
2	B	702	QA7	O31-C05	-3.95	1.15	1.23
2	A	701	QA7	O27-C12	3.34	1.50	1.43
2	A	701	QA7	P08-O29	-3.19	1.40	1.55
2	B	702	QA7	O30-C06	-3.17	1.15	1.21
2	B	702	QA7	P08-O29	-2.99	1.41	1.55
2	A	701	QA7	C18-C23	-2.84	1.33	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	701	QA7	C21-N20	-2.74	1.28	1.33
2	B	702	QA7	C18-C23	-2.70	1.33	1.40
2	B	702	QA7	C12-C11	2.70	1.59	1.53
2	A	701	QA7	P08-O28	-2.53	1.41	1.50
2	A	701	QA7	C12-C11	2.39	1.59	1.53
2	B	702	QA7	O07-C06	-2.39	1.34	1.37
2	A	701	QA7	C16-N17	-2.34	1.30	1.34
2	B	702	QA7	C21-N20	-2.29	1.29	1.33
2	A	701	QA7	O25-C11	2.26	1.50	1.45
2	B	702	QA7	C16-N17	-2.22	1.30	1.34
2	B	702	QA7	C21-N22	-2.13	1.28	1.32
2	B	702	QA7	P08-O07	-2.10	1.56	1.60
2	B	702	QA7	C19-N24	2.08	1.41	1.34
2	A	701	QA7	C21-N22	-2.01	1.28	1.32

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	701	QA7	O07-P08-O09	4.54	116.19	102.92
2	A	701	QA7	C12-C13-C14	4.19	107.29	100.98
2	B	702	QA7	O07-P08-O09	4.11	114.92	102.92
2	A	701	QA7	N22-C21-N20	-4.08	122.29	128.68
2	B	702	QA7	N22-C21-N20	-4.08	122.30	128.68
2	B	702	QA7	C12-C13-C14	2.56	104.83	100.98
2	A	701	QA7	O07-C06-O30	-2.32	119.61	122.53
2	A	701	QA7	P08-O07-C06	2.30	128.11	123.04
2	A	701	QA7	O26-C13-C14	-2.18	102.79	110.85

There are no chirality outliers.

All (9) torsion outliers are listed below:

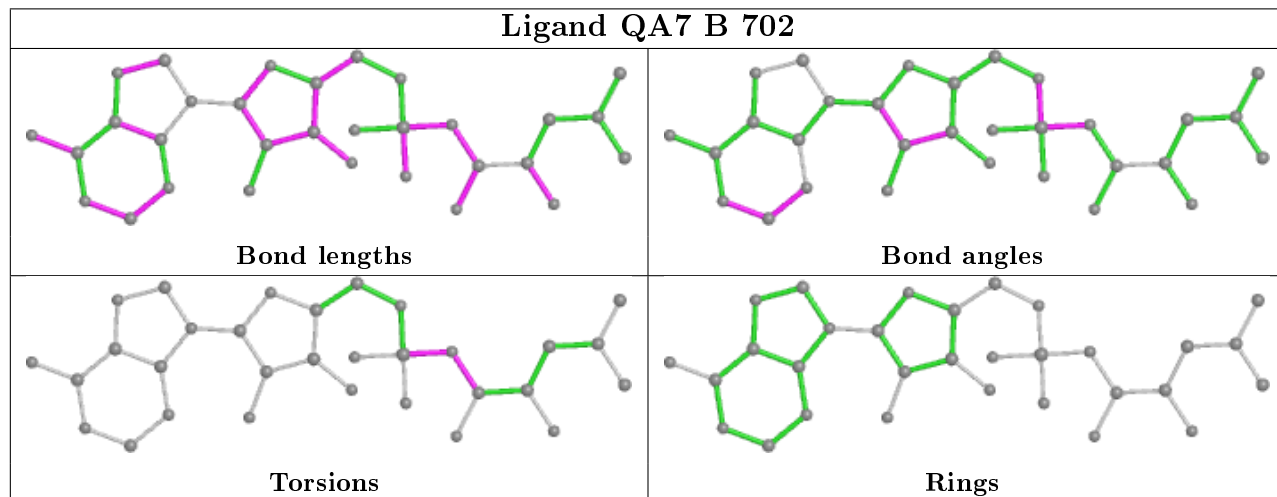
Mol	Chain	Res	Type	Atoms
2	B	702	QA7	C05-C06-O07-P08
2	B	702	QA7	O30-C06-O07-P08
2	A	701	QA7	C01-C02-C04-C05
4	B	701	GOL	C1-C2-C3-O3
2	A	701	QA7	C03-C02-C04-C05
2	B	702	QA7	C06-O07-P08-O09
4	B	701	GOL	O2-C2-C3-O3
2	A	701	QA7	C06-O07-P08-O09
2	A	701	QA7	C02-C04-C05-O31

There are no ring outliers.

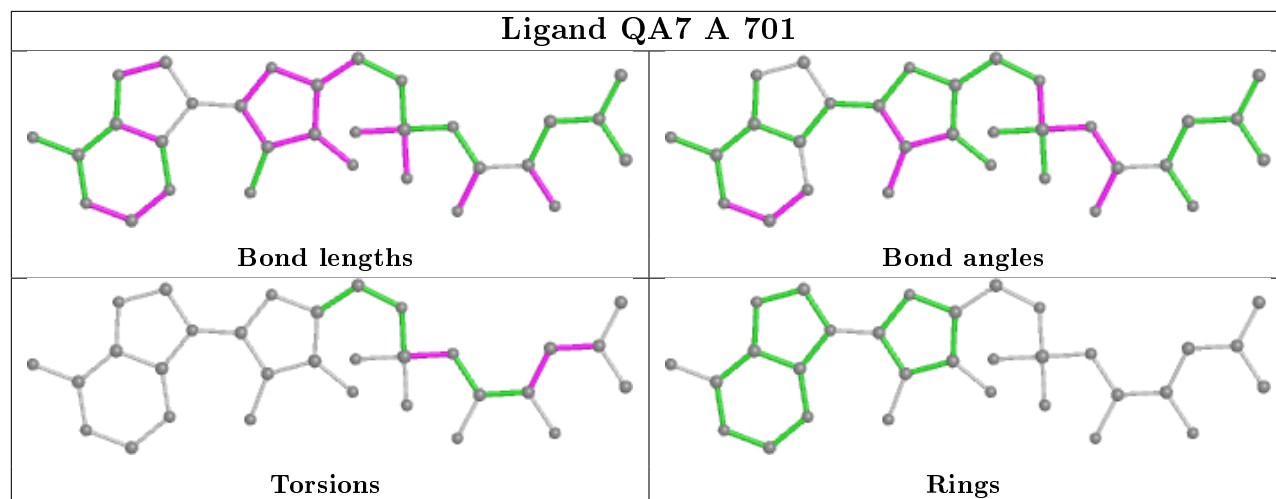
3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	702	QA7	1	0
3	A	709	SO4	1	0
4	B	701	GOL	1	0

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







## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q < 0.9
1	A	545/576 (94%)	0.89	56 (10%) <b>6</b> <b>9</b>	34, 50, 122, 151	23 (4%)
1	B	531/576 (92%)	1.16	82 (15%) <b>2</b> <b>3</b>	32, 52, 137, 154	15 (2%)
All	All	1076/1152 (93%)	1.03	138 (12%) <b>3</b> <b>5</b>	32, 51, 131, 154	38 (3%)

All (138) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	620	ARG	15.0
1	B	594	TYR	11.6
1	A	553	TYR	10.3
1	B	570	VAL	9.6
1	B	585	LEU	9.1
1	B	572	ALA	8.8
1	A	574	SER	8.6
1	B	593	LEU	8.2
1	B	558	ILE	7.8
1	B	553	TYR	7.8
1	A	569	PHE	7.7
1	A	614	MET	7.4
1	B	614	MET	7.3
1	B	599	ILE	7.2
1	B	623	PRO	7.1
1	B	563	PRO	7.0
1	A	588	PHE	6.5
1	B	598	TYR	6.4
1	A	558	ILE	6.1
1	B	610	ILE	5.7
1	A	622	ILE	5.6
1	A	565	VAL	5.5
1	A	610	ILE	5.4
1	B	589	PHE	5.3

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	587	LEU	5.2
1	B	592	LYS	5.2
1	B	602	ALA	5.1
1	A	586	ILE	5.1
1	A	581	ALA	5.0
1	A	346	ARG	5.0
1	B	621	ILE	5.0
1	A	611	ALA	4.9
1	A	570	VAL	4.9
1	A	599	ILE	4.9
1	B	565	VAL	4.8
1	B	561	GLU	4.8
1	A	562	VAL	4.7
1	A	623	PRO	4.6
1	B	571	ALA	4.5
1	A	573	CYS	4.5
1	A	585	LEU	4.5
1	B	597	ALA	4.5
1	B	588	PHE	4.4
1	B	575	VAL	4.3
1	B	450	ARG	4.3
1	B	555	ILE	4.3
1	B	619	SER	4.3
1	B	606	ILE	4.3
1	B	587	LEU	4.2
1	B	569	PHE	4.1
1	A	572	ALA	4.1
1	A	559	ALA	4.1
1	B	567	THR	4.1
1	A	594	TYR	4.0
1	B	556	GLU	4.0
1	B	573	CYS	3.9
1	A	583	ASP	3.9
1	A	564	GLY	3.8
1	B	609	HIS	3.8
1	B	616	LEU	3.8
1	A	626	LYS	3.7
1	B	543	ILE	3.7
1	A	600	MET	3.6
1	A	593	LEU	3.5
1	B	441	GLU	3.5
1	A	619	SER	3.4

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	188	GLU	3.4
1	B	624	VAL	3.4
1	B	458	GLY	3.3
1	B	568	SER	3.3
1	B	550	TYR	3.3
1	A	582	SER	3.3
1	B	560	GLU	3.2
1	B	622	ILE	3.2
1	A	595	GLU	3.2
1	B	600	MET	3.2
1	A	616	LEU	3.2
1	A	401	PRO	3.1
1	A	560	GLU	3.1
1	B	187	ARG	3.1
1	A	615	GLY	3.1
1	A	223	PHE	3.1
1	B	595	GLU	2.9
1	A	568	SER	2.9
1	A	571	ALA	2.9
1	B	603	SER	2.9
1	B	551	HIS	2.9
1	B	591	PRO	2.9
1	B	542	MET	2.9
1	A	606	ILE	2.8
1	A	618	ALA	2.8
1	B	121	LYS	2.8
1	B	586	ILE	2.8
1	B	223	PHE	2.8
1	B	605	HIS	2.8
1	B	559	ALA	2.8
1	B	601	ARG	2.8
1	B	266	GLY	2.7
1	B	557	ALA	2.7
1	A	552	ASN	2.7
1	A	613	LYS	2.7
1	B	454	ALA	2.7
1	A	645	ARG	2.7
1	B	438	LEU	2.7
1	A	589	PHE	2.6
1	B	611	ALA	2.6
1	B	449	LEU	2.6
1	A	555	ILE	2.6

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Mol	Chain	Res	Type	RSRZ
1	B	552	ASN	2.6
1	B	604	GLN	2.5
1	B	460	VAL	2.5
1	B	607	LYS	2.5
1	B	439	THR	2.5
1	B	443	THR	2.5
1	A	605	HIS	2.5
1	B	440	PHE	2.4
1	B	625	GLN	2.4
1	A	624	VAL	2.4
1	A	450	ARG	2.4
1	A	541	ASP	2.3
1	B	456	GLU	2.3
1	A	556	GLU	2.3
1	B	618	ALA	2.3
1	A	567	THR	2.3
1	B	615	GLY	2.3
1	B	564	GLY	2.2
1	B	545	ILE	2.2
1	A	625	GLN	2.2
1	B	531	GLY	2.2
1	A	442	GLU	2.2
1	A	620	ARG	2.2
1	B	124	LEU	2.2
1	A	456	GLU	2.1
1	B	448	GLN	2.1
1	A	638	GLU	2.1
1	B	562	VAL	2.1
1	B	270	CYS	2.1
1	B	549	ASN	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 monosaccharides in this entry.

## 6.4 Ligands [i](#)

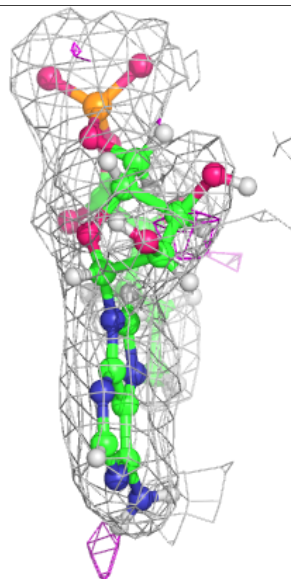
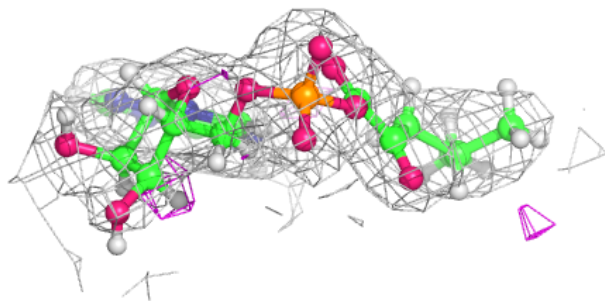
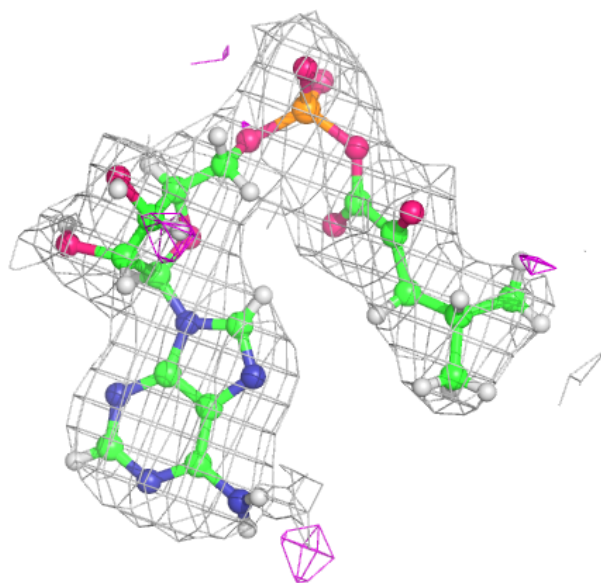
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

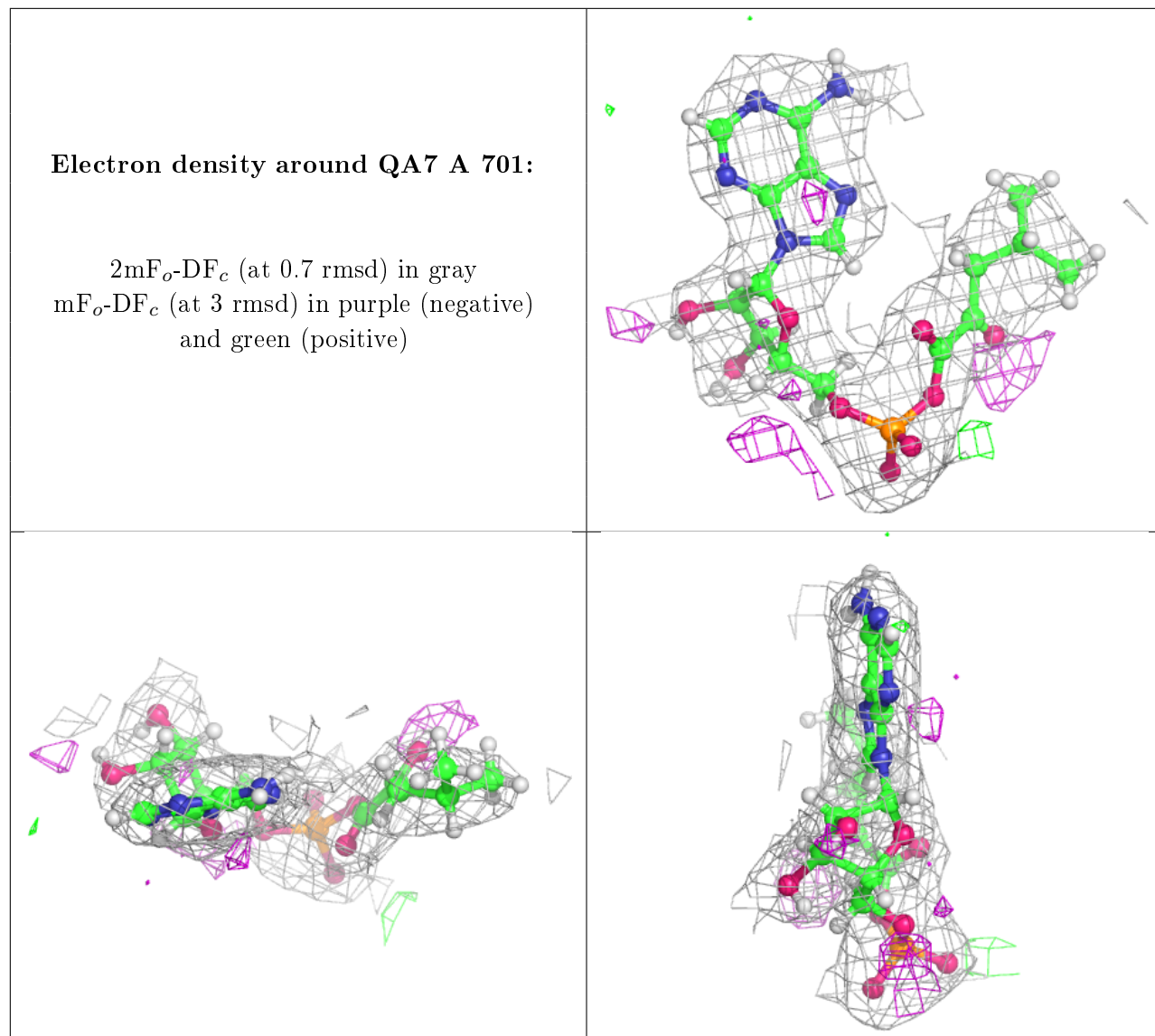
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	SO4	B	707	5/5	0.81	0.19	83,94,101,123	0
3	SO4	B	710	5/5	0.82	0.25	97,122,139,145	0
4	GOL	B	701	6/6	0.82	0.21	63,75,89,89	0
3	SO4	A	712	5/5	0.85	0.19	82,86,99,101	0
3	SO4	B	706	5/5	0.87	0.15	78,86,91,99	0
3	SO4	A	710	5/5	0.89	0.13	95,99,112,112	0
3	SO4	A	708	5/5	0.90	0.12	73,89,91,101	0
3	SO4	A	709	5/5	0.90	0.11	83,89,101,113	0
3	SO4	B	709	5/5	0.91	0.09	74,81,95,101	0
3	SO4	A	705	5/5	0.93	0.17	56,57,62,66	0
3	SO4	A	713	5/5	0.93	0.11	86,95,96,110	0
3	SO4	A	714	5/5	0.94	0.14	60,79,100,149	0
3	SO4	A	702	5/5	0.94	0.22	50,64,66,71	0
3	SO4	A	706	5/5	0.94	0.18	59,63,79,82	0
2	QA7	B	702	31/31	0.95	0.14	35,51,63,70	0
3	SO4	B	705	5/5	0.95	0.18	62,72,77,77	0
2	QA7	A	701	31/31	0.96	0.15	39,49,59,61	0
3	SO4	B	708	5/5	0.96	0.12	77,79,86,99	0
3	SO4	B	703	5/5	0.96	0.16	63,67,70,80	0
3	SO4	A	711	5/5	0.97	0.17	57,63,76,78	0
3	SO4	A	707	5/5	0.97	0.09	68,69,78,84	0
3	SO4	A	703	5/5	0.97	0.11	70,74,78,81	0
3	SO4	A	704	5/5	0.98	0.10	69,79,86,93	0
3	SO4	B	704	5/5	0.99	0.13	51,55,57,67	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 QA7 B 702:**

$2mF_o-DF_c$  (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.