



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 06:50 AM UTC

PDB ID : 9D8E / pdb_00009d8e
Title : Crystal structure of the ACVR1 (ALK2) Kinase Domain in complex with inhibitor CDD-2789
Authors : Ta, H.M.; Kim, C.; Jimmidi, K.; Matzuk, M.M.
Deposited on : 2024-08-19
Resolution : 1.72 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

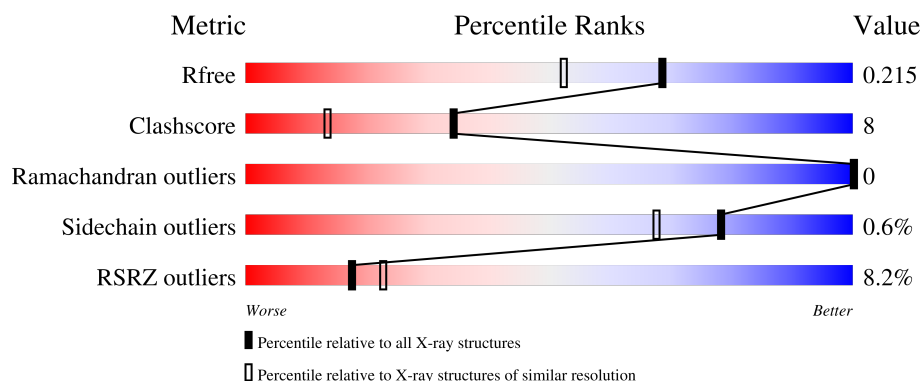
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.72 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	1039 (1.72-1.72)
Clashscore	190562	1049 (1.72-1.72)
Ramachandran outliers	187476	1041 (1.72-1.72)
Sidechain outliers	187428	1041 (1.72-1.72)
RSRZ outliers	180081	1039 (1.72-1.72)

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	330	6% 82% 11% 7%
1	B	330	9% 80% 12% 7%

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 10357 atoms, of which 5017 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.

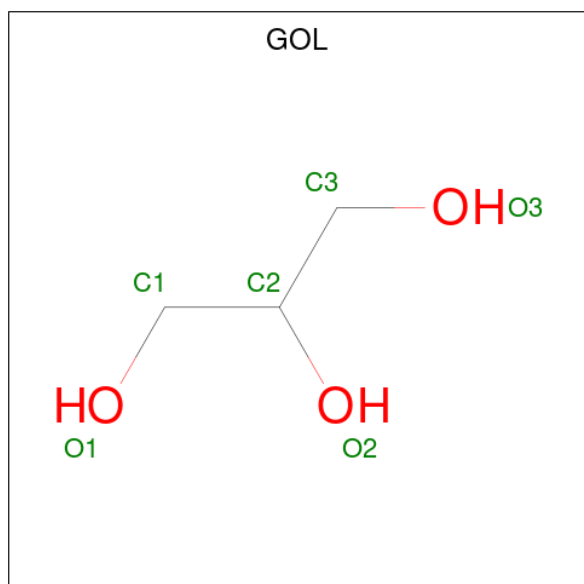
- Molecule 1 is a protein called Activin receptor type-1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	307	Total	C	H	N	O	S	0	5	0
			4923	1571	2465	428	444	15			
1	B	306	Total	C	H	N	O	S	0	7	0
			4915	1566	2460	427	447	15			

There are 4 discrepancies between the modelled and reference sequences:

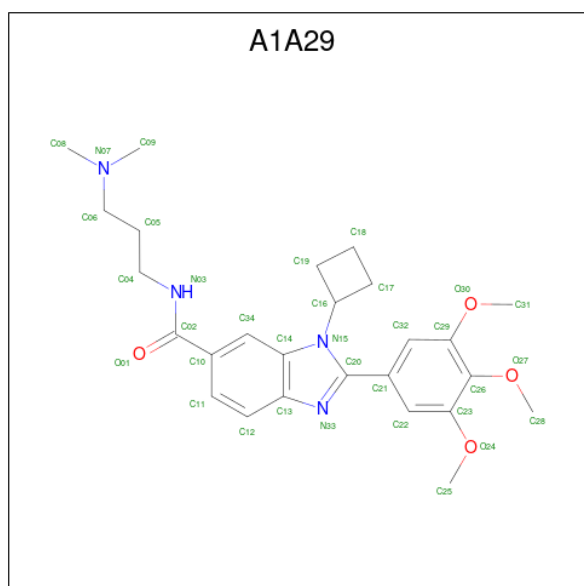
Chain	Residue	Modelled	Actual	Comment	Reference
A	170	SER	-	expression tag	UNP Q04771
A	171	MET	-	expression tag	UNP Q04771
B	170	SER	-	expression tag	UNP Q04771
B	171	MET	-	expression tag	UNP Q04771

- Molecule 2 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



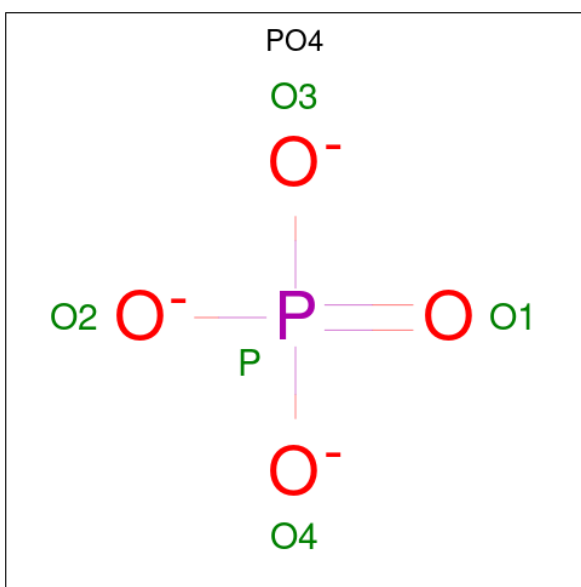
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	H	O	0	0
			14	3	8	3		
2	A	1	Total	C	H	O	0	0
			14	3	8	3		
2	B	1	Total	C	H	O	0	0
			14	3	8	3		

- Molecule 3 is 1-cyclobutyl-N-[3-(dimethylamino)propyl]-2-(3,4,5-trimethoxyphenyl)-1H-1,3-benzimidazole-6-carboxamide (CCD ID: A1A29) (formula: $C_{26}H_{34}N_4O_4$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	H	N	O	0	0
			68	26	34	4	4		
3	B	1	Total	C	H	N	O	0	0
			68	26	34	4	4		

- Molecule 4 is PHOSPHATE ION (CCD ID: PO4) (formula: O_4P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	O	P	0	0
			5	4	1		
4	A	1	Total	O	P	0	0
			5	4	1		
4	A	1	Total	O	P	0	0
			5	4	1		
4	A	1	Total	O	P	0	0
			5	4	1		
4	A	1	Total	O	P	0	0
			5	4	1		
4	B	1	Total	O	P	0	0
			5	4	1		
4	B	1	Total	O	P	0	0
			5	4	1		
4	B	1	Total	O	P	0	0
			5	4	1		
4	B	1	Total	O	P	0	0
			5	4	1		

- Molecule 5 is water.

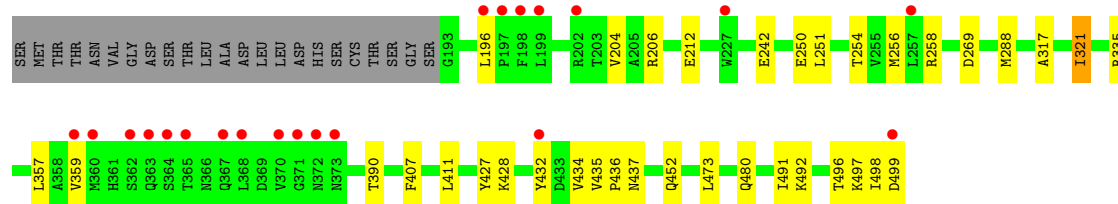
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	164	Total	O	0	0
			164	164		
5	B	132	Total	O	0	0
			132	132		

3 Residue-property plots

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

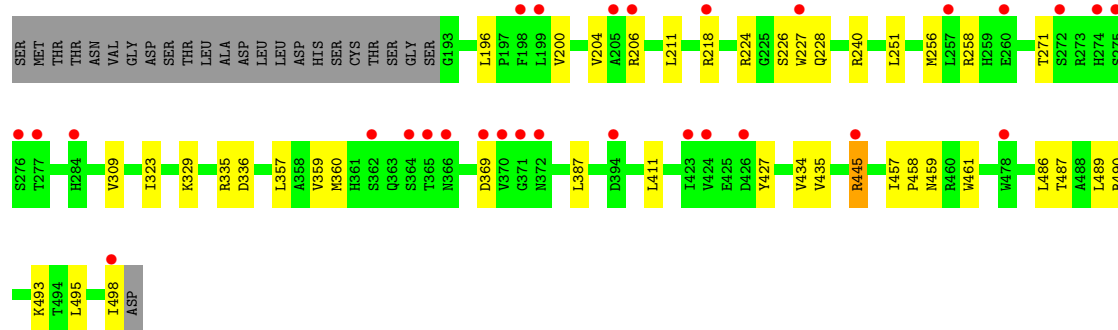
• Molecule 1: Activin receptor type-1

Chain A: 



• Molecule 1: Activin receptor type-1

Chain B: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	52.68Å 70.75Å 158.56Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	64.61 – 1.72 64.61 – 1.72	Depositor EDS
% Data completeness (in resolution range)	99.9 (64.61-1.72) 99.9 (64.61-1.72)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.34 (at 1.72Å)	Xtriage
Refinement program	PHENIX (1.21rc1_5049: ???)	Depositor
R, R_{free}	0.191 , 0.215 0.191 , 0.215	Depositor DCC
R_{free} test set	1997 reflections (3.13%)	wwPDB-VP
Wilson B-factor (Å ²)	24.5	Xtriage
Anisotropy	0.255	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.44 , 41.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	10357	wwPDB-VP
Average B, all atoms (Å ²)	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 24.21 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 4.0096e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: A1A29, GOL, PO4

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	0.37	0/2529	0.55	0/3433
1	B	0.31	0/2545	0.52	0/3455
All	All	0.34	0/5074	0.54	0/6888

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

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	2458	2465	2448	41	1
1	B	2455	2460	2426	35	1
2	A	12	16	16	2	0
2	B	6	8	8	2	0
3	A	34	34	0	0	0
3	B	34	34	0	0	0
4	A	25	0	0	0	0
4	B	20	0	0	0	0
5	A	164	0	0	17	5
5	B	132	0	0	5	2
All	All	5340	5017	4898	76	6

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 8.

All (76) 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:212:GLU:OE1	5:A:801:HOH:O	1.54	1.21
1:A:437:ASN:OD1	5:A:802:HOH:O	1.70	1.09
1:B:336:ASP:OD2	5:B:601:HOH:O	1.87	0.92
1:A:212:GLU:OE1	5:A:803:HOH:O	1.90	0.90
1:A:288:MET:HE3	5:A:869:HOH:O	1.76	0.86
1:A:242:GLU:OE1	5:A:804:HOH:O	1.94	0.84
1:B:459:ASN:ND2	5:B:602:HOH:O	2.14	0.80
1:A:499:ASP:O	5:A:805:HOH:O	1.99	0.79
1:A:390:THR:OG1	5:A:806:HOH:O	2.03	0.77
1:A:492:LYS:O	1:A:496[B]:THR:HG23	1.89	0.73
1:A:497:LYS:HE3	5:A:809:HOH:O	1.89	0.72
1:B:251[B]:LEU:HD13	1:B:360:MET:SD	2.30	0.71
1:A:497:LYS:CD	5:A:809:HOH:O	2.42	0.67
1:A:497:LYS:CE	5:A:809:HOH:O	2.43	0.65
1:A:251:LEU:C	1:A:251:LEU:HD23	2.25	0.61
1:B:204:VAL:HG22	1:B:227:TRP:CZ2	2.35	0.61
1:B:256:MET:HA	1:B:256:MET:HE2	1.84	0.60
1:A:196:LEU:CD1	1:A:204:VAL:HG21	2.33	0.58
1:A:288:MET:O	5:A:807:HOH:O	2.18	0.56
1:A:407:PHE:CE2	1:A:491:ILE:HG21	2.39	0.56
1:A:269:ASP:OD2	2:A:701:GOL:H12	2.07	0.55
1:A:256:MET:SD	1:A:258:ARG:HG3	2.47	0.54
1:B:335:ARG:HD3	1:B:357:LEU:O	2.07	0.54
1:A:498:ILE:O	1:A:499:ASP:CB	2.56	0.53
1:B:486:LEU:HD22	1:B:490:ARG:HG2	1.91	0.53
1:B:495:LEU:HD23	1:B:498:ILE:HD12	1.91	0.53
1:A:428:LYS:NZ	5:A:812:HOH:O	2.38	0.53
1:B:487:THR:HB	2:B:502:GOL:H32	1.91	0.52
1:B:335:ARG:HD2	1:B:359[A]:VAL:HG23	1.90	0.52
1:B:196:LEU:CD1	1:B:204:VAL:HG21	2.40	0.52
1:A:432[B]:TYR:HE1	5:A:802:HOH:O	1.93	0.51
1:A:497:LYS:HD3	5:A:809:HOH:O	2.09	0.51
1:A:250:GLU:OE1	5:A:808:HOH:O	2.20	0.51
1:A:335:ARG:HD2	1:A:359:VAL:HG13	1.91	0.50
1:B:256:MET:HE1	1:B:258:ARG:HD2	1.92	0.50
1:B:335:ARG:HD2	1:B:359[B]:VAL:HG13	1.92	0.50
1:B:323:ILE:HD12	1:B:329:LYS:HG2	1.94	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:251[A]:LEU:C	1:B:251[A]:LEU:HD23	2.36	0.50
1:B:218:ARG:HH11	1:B:240:ARG:HD2	1.76	0.49
1:A:452:GLN:HG2	1:A:480:GLN:OE1	2.13	0.49
1:A:196:LEU:HD13	1:A:204:VAL:HG21	1.94	0.49
1:B:206:ARG:NH1	1:B:271:THR:OG1	2.46	0.49
1:B:459:ASN:CG	5:B:602:HOH:O	2.49	0.49
1:B:387:LEU:HB3	1:B:445[A]:ARG:HG2	1.96	0.48
1:B:206:ARG:CD	1:B:206:ARG:N	2.76	0.48
1:B:211:LEU:HD12	1:B:224:ARG:NH1	2.29	0.48
1:B:196:LEU:HD13	1:B:200:VAL:HG12	1.95	0.48
1:A:269:ASP:OD2	2:A:701:GOL:C1	2.62	0.48
1:B:204:VAL:HG22	1:B:227:TRP:CE2	2.48	0.47
1:B:336:ASP:OD2	5:B:603:HOH:O	2.20	0.47
1:B:457:ILE:HG23	1:B:461:TRP:CE3	2.49	0.46
1:B:487:THR:HB	2:B:502:GOL:H11	1.98	0.46
1:B:228:GLN:HA	5:B:725:HOH:O	2.14	0.45
1:A:250:GLU:O	1:A:254:THR:HG23	2.16	0.45
1:B:489:LEU:HD11	1:B:493:LYS:HE3	1.97	0.45
1:B:434:VAL:HG23	1:B:435:VAL:HG13	1.98	0.45
1:A:212:GLU:CD	5:A:801:HOH:O	2.32	0.44
1:A:497:LYS:HG2	5:A:809:HOH:O	2.16	0.44
1:A:335:ARG:HD3	1:A:357:LEU:O	2.16	0.44
1:B:309:VAL:CG1	1:B:411:LEU:HD23	2.47	0.44
1:A:407:PHE:CZ	1:A:411:LEU:HD21	2.53	0.43
1:A:427:TYR:CD2	1:A:427:TYR:C	2.97	0.43
1:B:206:ARG:H	1:B:206:ARG:HD3	1.84	0.43
1:A:434:VAL:HG23	1:A:435:VAL:HG13	2.01	0.43
1:A:407:PHE:HE2	1:A:491:ILE:HG21	1.84	0.42
1:B:309:VAL:HG11	1:B:411:LEU:HD23	2.01	0.42
1:A:428:LYS:HD3	1:A:432[A]:TYR:CZ	2.55	0.42
1:A:435:VAL:HB	1:A:436:PRO:HD2	2.02	0.42
1:B:211:LEU:HD11	1:B:226:SER:HB2	2.02	0.41
1:B:458:PRO:HD2	1:B:461:TRP:CE2	2.55	0.41
1:A:317:ALA:O	1:A:321[A]:ILE:HG13	2.21	0.41
1:A:428:LYS:HD3	1:A:432[A]:TYR:CE2	2.55	0.41
1:A:256:MET:HE1	1:A:258:ARG:HB2	2.03	0.41
1:B:427:TYR:CD2	1:B:427:TYR:C	2.97	0.40

All (6) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:A:827:HOH:O	5:A:836:HOH:O[1_655]	1.85	0.35
5:A:955:HOH:O	5:B:662:HOH:O[1_565]	1.91	0.29
5:A:959:HOH:O	5:A:960:HOH:O[1_655]	2.13	0.07
5:A:806:HOH:O	5:A:924:HOH:O[1_455]	2.14	0.06
5:A:816:HOH:O	5:B:634:HOH:O[4_445]	2.14	0.06
1:A:206:ARG:HH21	1:B:369:ASP:OD1[3_654]	1.56	0.04

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	310/330 (94%)	302 (97%)	8 (3%)	0	100	100
1	B	311/330 (94%)	306 (98%)	5 (2%)	0	100	100
All	All	621/660 (94%)	608 (98%)	13 (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	269/294 (92%)	266 (99%)	3 (1%)	65	50
1	B	271/294 (92%)	269 (99%)	2 (1%)	76	64
All	All	540/588 (92%)	535 (99%)	5 (1%)	78	57

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	321[A]	ILE
1	A	321[B]	ILE
1	A	473	LEU
1	B	445[A]	ARG
1	B	445[B]	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	366	ASN
1	B	261	ASN
1	B	453	GLN

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](#)

14 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	GOL	A	701	-	5,5,5	0.29	0	5,5,5	0.79	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	PO4	B	506	-	4,4,4	1.56	1 (25%)	6,6,6	0.44	0
2	GOL	A	702	-	5,5,5	0.27	0	5,5,5	0.37	0
3	A1A29	B	501	-	37,37,37	1.47	3 (8%)	52,52,52	1.45	6 (11%)
4	PO4	A	707	-	4,4,4	1.79	1 (25%)	6,6,6	0.78	0
4	PO4	A	708	-	4,4,4	1.43	1 (25%)	6,6,6	1.04	0
4	PO4	A	706	-	4,4,4	1.58	1 (25%)	6,6,6	1.07	1 (16%)
3	A1A29	A	703	-	37,37,37	1.43	5 (13%)	52,52,52	1.23	4 (7%)
4	PO4	B	504	-	4,4,4	1.60	1 (25%)	6,6,6	0.61	0
4	PO4	B	505	-	4,4,4	1.43	1 (25%)	6,6,6	0.63	0
4	PO4	B	503	-	4,4,4	1.58	1 (25%)	6,6,6	0.75	0
4	PO4	A	705	-	4,4,4	1.68	1 (25%)	6,6,6	0.93	0
2	GOL	B	502	-	5,5,5	0.57	0	5,5,5	1.34	1 (20%)
4	PO4	A	704	-	4,4,4	1.29	0	6,6,6	0.55	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GOL	A	701	-	-	3/4/4/4	-
2	GOL	A	702	-	-	2/4/4/4	-
3	A1A29	B	501	-	-	0/25/31/31	0/4/4/4
3	A1A29	A	703	-	-	3/25/31/31	0/4/4/4
2	GOL	B	502	-	-	4/4/4/4	-

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	501	A1A29	C02-N03	4.98	1.44	1.33
3	A	703	A1A29	C02-N03	4.97	1.44	1.33
4	A	707	PO4	P-O1	3.34	1.58	1.50
3	A	703	A1A29	C14-C13	-3.18	1.35	1.40
4	A	705	PO4	P-O1	2.92	1.57	1.50
4	B	504	PO4	P-O1	2.90	1.57	1.50
4	A	706	PO4	P-O1	2.82	1.57	1.50
3	B	501	A1A29	C14-N15	-2.78	1.35	1.40
3	B	501	A1A29	C14-C13	-2.74	1.35	1.40
4	B	503	PO4	P-O1	2.65	1.56	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	703	A1A29	C14-N15	-2.56	1.36	1.40
4	B	506	PO4	P-O1	2.52	1.56	1.50
4	A	708	PO4	P-O1	2.52	1.56	1.50
3	A	703	A1A29	C13-N33	-2.30	1.35	1.39
4	B	505	PO4	P-O1	2.27	1.55	1.50
3	A	703	A1A29	O30-C29	2.00	1.40	1.37

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	501	A1A29	C17-C16-N15	-4.70	106.49	120.43
3	B	501	A1A29	C13-C14-N15	4.31	108.72	105.12
3	A	703	A1A29	C13-C14-N15	4.08	108.53	105.12
3	B	501	A1A29	C19-C16-N15	3.52	130.88	120.43
3	A	703	A1A29	C17-C16-N15	-3.43	110.26	120.43
3	A	703	A1A29	C11-C10-C34	2.57	122.23	119.25
3	B	501	A1A29	C29-C26-C23	2.57	122.07	119.56
3	A	703	A1A29	C19-C16-N15	2.48	127.79	120.43
3	B	501	A1A29	O24-C23-C26	2.47	119.37	115.14
2	B	502	GOL	O2-C2-C3	2.42	119.21	109.18
3	B	501	A1A29	C11-C10-C34	2.19	121.78	119.25
4	A	706	PO4	O4-P-O2	2.07	114.35	107.91

There are no chirality outliers.

All (12) torsion outliers are listed below:

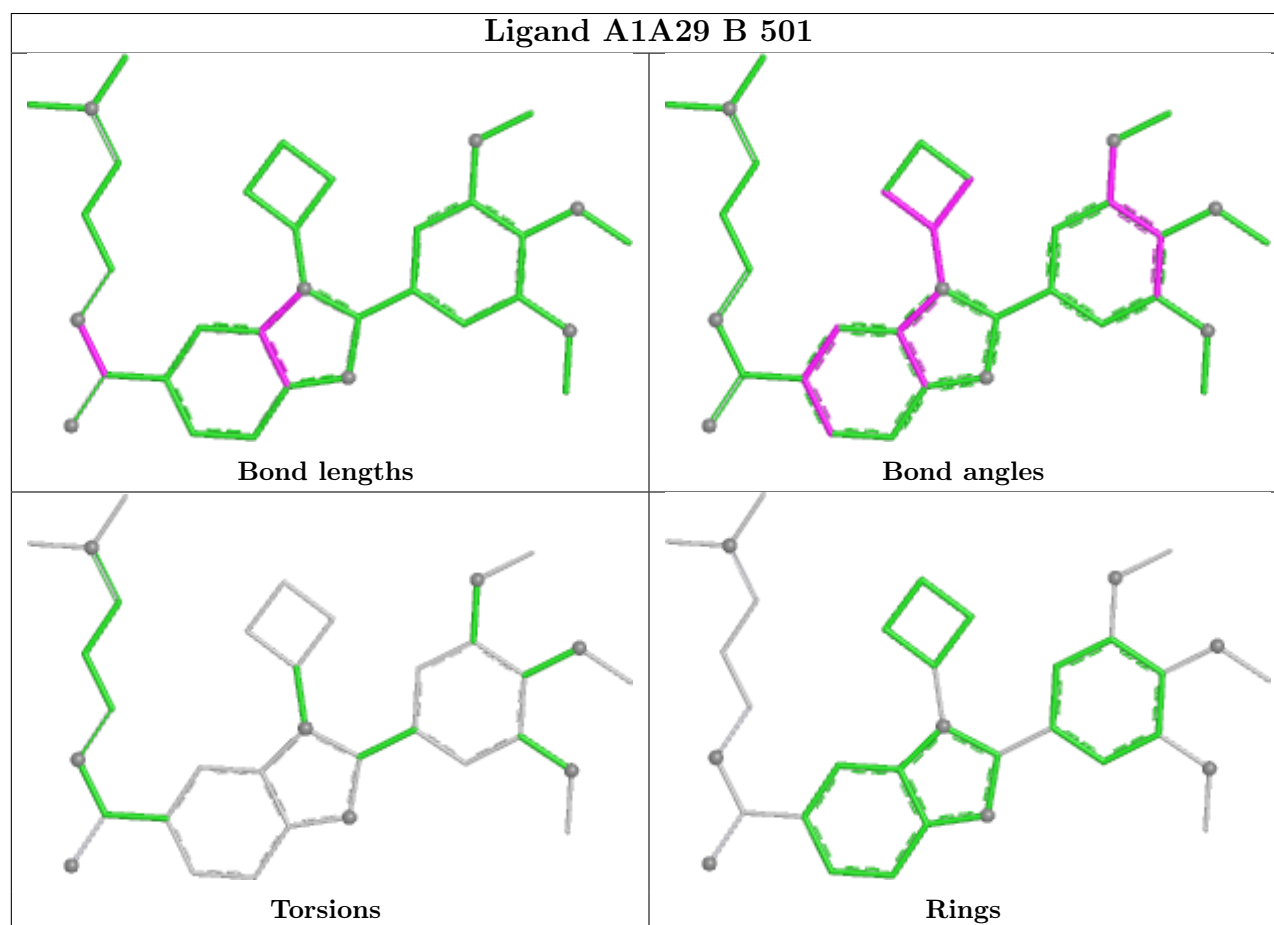
Mol	Chain	Res	Type	Atoms
2	A	701	GOL	O1-C1-C2-O2
2	A	701	GOL	O1-C1-C2-C3
2	A	702	GOL	O1-C1-C2-O2
2	A	702	GOL	O1-C1-C2-C3
3	A	703	A1A29	N03-C04-C05-C06
2	B	502	GOL	O1-C1-C2-C3
2	B	502	GOL	C1-C2-C3-O3
2	B	502	GOL	O1-C1-C2-O2
2	B	502	GOL	O2-C2-C3-O3
3	A	703	A1A29	C05-C06-N07-C08
3	A	703	A1A29	C05-C06-N07-C09
2	A	701	GOL	C1-C2-C3-O3

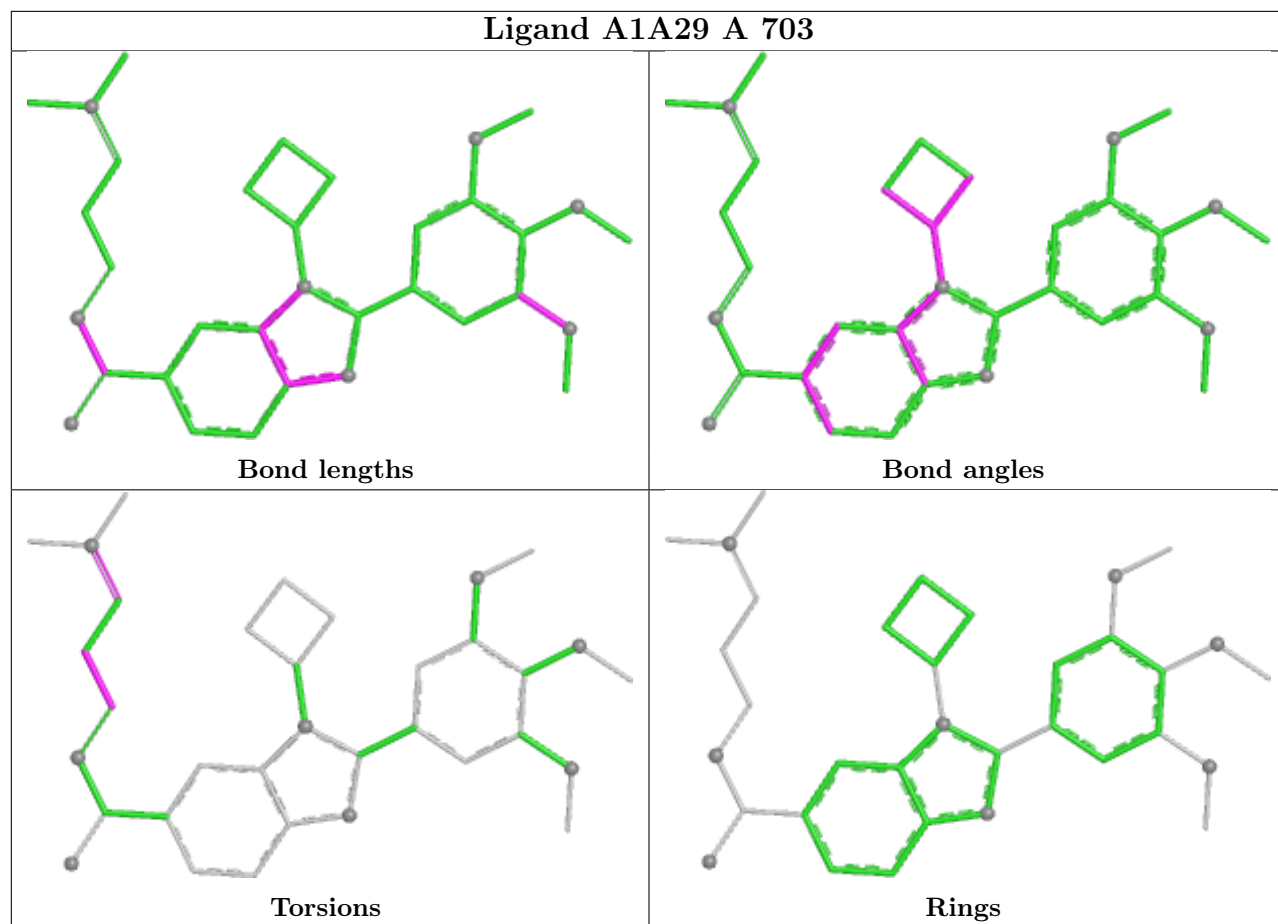
There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	701	GOL	2	0
2	B	502	GOL	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

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, 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	307/330 (93%)	0.36	21 (6%) 23 29	13, 31, 62, 102	4 (1%)
1	B	306/330 (92%)	0.57	29 (9%) 14 19	13, 38, 68, 108	5 (1%)
All	All	613/660 (92%)	0.47	50 (8%) 17 23	13, 34, 67, 108	9 (1%)

All (50) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	432[A]	TYR	7.4
1	B	370	VAL	5.7
1	B	365	THR	4.5
1	B	366	ASN	4.4
1	A	372	ASN	4.0
1	A	198	PHE	3.9
1	A	370	VAL	3.8
1	B	498	ILE	3.6
1	A	371	GLY	3.4
1	A	499	ASP	3.4
1	A	365	THR	3.4
1	B	274	HIS	3.3
1	B	198	PHE	3.2
1	B	275	SER	3.2
1	A	368	LEU	3.1
1	A	199	LEU	3.0
1	B	423	ILE	3.0
1	B	371	GLY	3.0
1	B	199	LEU	2.9
1	B	227	TRP	2.8
1	A	227	TRP	2.7
1	B	218	ARG	2.7
1	A	360	MET	2.7
1	B	364	SER	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	196	LEU	2.5
1	B	369	ASP	2.5
1	A	367	GLN	2.5
1	A	257	LEU	2.5
1	B	445[A]	ARG	2.4
1	B	257	LEU	2.4
1	A	373	ASN	2.4
1	B	206	ARG	2.4
1	B	478	TRP	2.3
1	A	197	PRO	2.3
1	B	277	THR	2.3
1	B	372	ASN	2.3
1	B	394	ASP	2.3
1	B	205	ALA	2.2
1	B	276	SER	2.2
1	A	359	VAL	2.2
1	B	260	GLU	2.2
1	A	362	SER	2.2
1	A	363	GLN	2.2
1	B	426	ASP	2.1
1	A	202	ARG	2.1
1	B	362	SER	2.0
1	B	424	VAL	2.0
1	B	284[A]	HIS	2.0
1	A	364	SER	2.0
1	B	272	SER	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 [i](#)

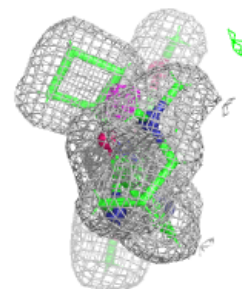
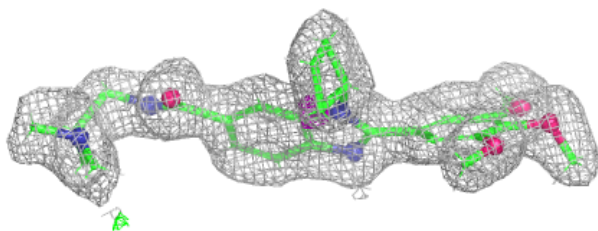
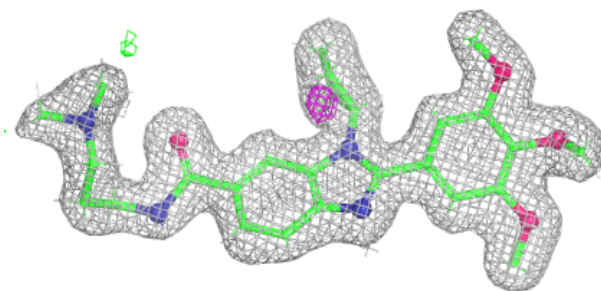
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

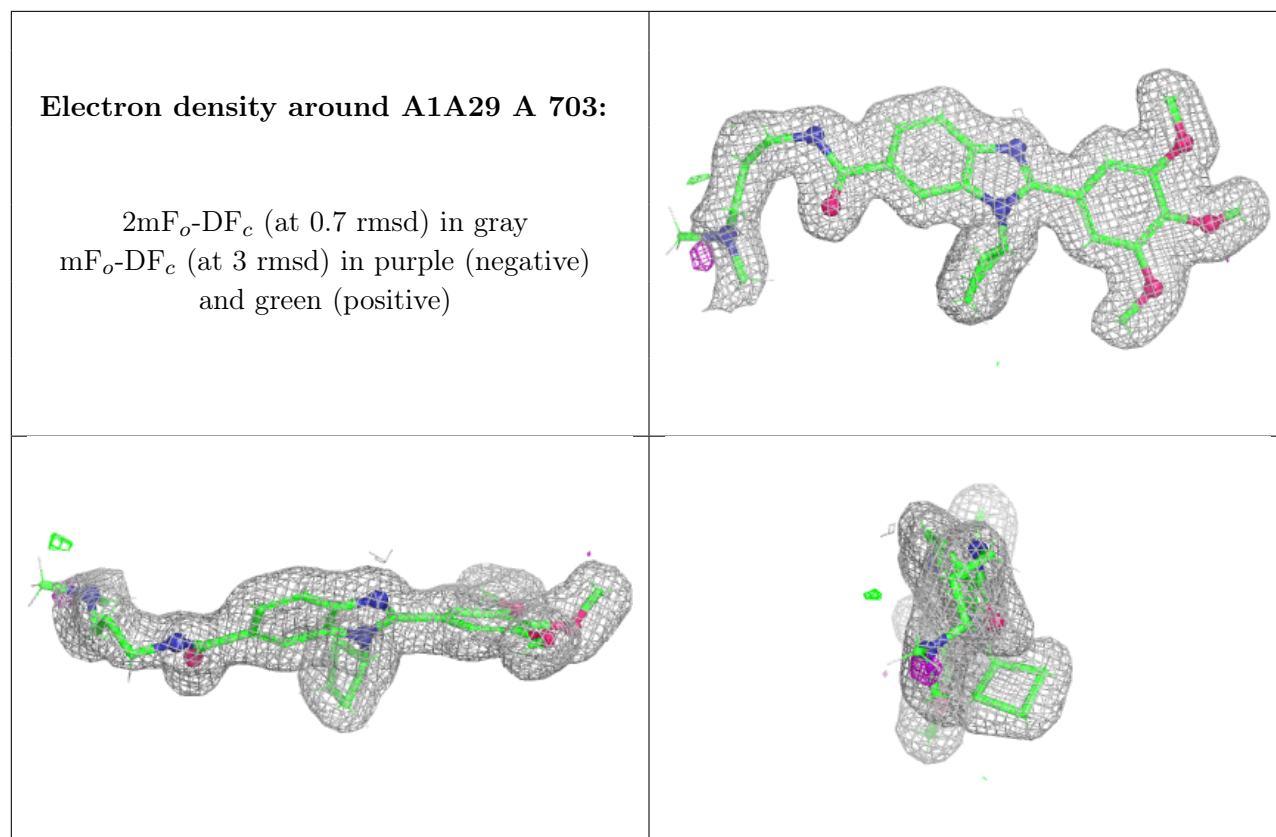
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	GOL	A	701	6/6	0.66	0.21	41,56,68,73	0
2	GOL	A	702	6/6	0.85	0.15	29,55,105,107	0
2	GOL	B	502	6/6	0.85	0.13	26,41,61,75	0
4	PO4	A	707	5/5	0.93	0.10	32,34,41,53	0
3	A1A29	B	501	34/34	0.94	0.08	19,25,46,53	0
4	PO4	A	708	5/5	0.96	0.07	30,30,35,46	0
4	PO4	B	503	5/5	0.96	0.07	28,28,31,34	0
4	PO4	B	504	5/5	0.96	0.07	28,30,31,31	0
3	A1A29	A	703	34/34	0.97	0.07	16,22,47,61	0
4	PO4	A	704	5/5	0.97	0.07	25,27,28,31	0
4	PO4	B	506	5/5	0.97	0.07	28,30,31,34	0
4	PO4	A	706	5/5	0.98	0.05	21,23,23,25	0
4	PO4	B	505	5/5	0.98	0.06	22,29,31,34	0
4	PO4	A	705	5/5	0.98	0.05	27,27,30,31	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 A1A29 B 501:

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.