



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 1, 2022 – 01:08 PM EDT

PDB ID : 5RL7  
Title : PanDDA analysis group deposition – Crystal Structure of SARS-CoV-2 heli-  
case in complex with Z364321922  
Authors : Newman, J.A.; Yosaatmadja, Y.; Douangamath, A.; Aimon, A.; Powell, A.J.;  
Dias, A.; Fearon, D.; Dunnett, L.; Brandao-Neto, J.; Krojer, T.; Skyner, R.;  
Gorrie-Stone, T.; Thompson, W.; von Delft, F.; Arrowsmith, C.H.; Edwards,  
A.; Bountra, C.; Gileadi, O.  
Deposited on : 2020-09-16  
Resolution : 1.89 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.

The types of validation reports are described at <http://www.wwpdb.org/validation/2017/FAQs#types>.

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The following versions of software and data (see [references](#) ①) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (Phenix) : 1.13  
EDS : 2.29  
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) : 2.29

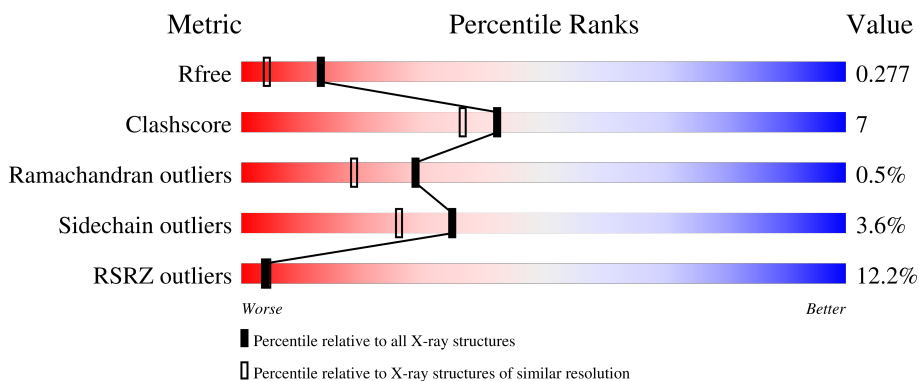
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.89 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	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

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  $\geq 3$ , 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	601	
1	B	601	

## 2 Entry composition [i](#)

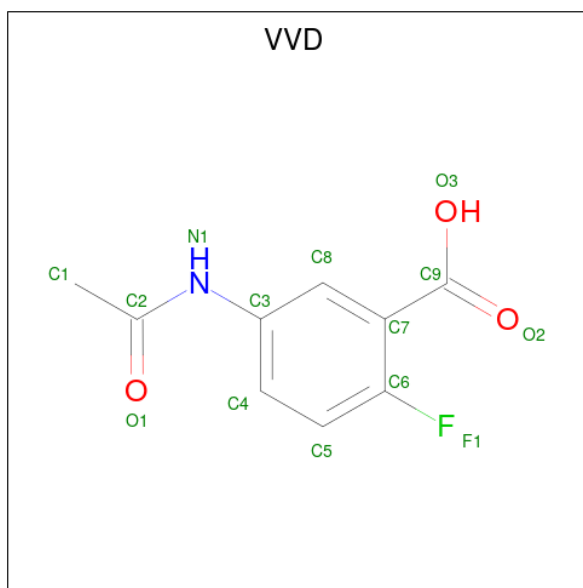
There are 5 unique types of molecules in this entry. The entry contains 9433 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Helicase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	B	585	Total 4508	C 2875	N 750	O 848	S 35	0	1	0
1	A	572	Total 4417	C 2816	N 737	O 832	S 32	0	0	0

- Molecule 2 is 5-(acetylamino)-2-fluorobenzoic acid (three-letter code: VVD) (formula:  $C_9H_8FNO_3$ ) (labeled as "Ligand of Interest" by depositor).

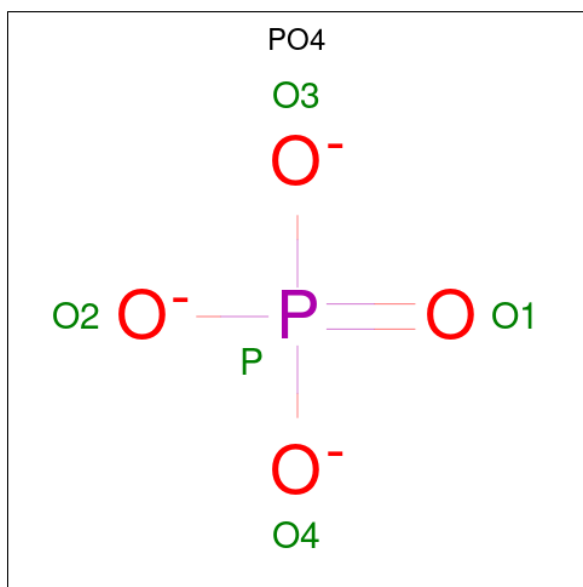


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	F	N			O
2	B	1	Total 14	C 9	F 1	N 1	O 3	0	0
2	A	1	Total 14	C 9	F 1	N 1	O 3	0	0

- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	3	Total	Zn	0	0
			3	3		
3	A	3	Total	Zn	0	0
			3	3		

- Molecule 4 is PHOSPHATE ION (three-letter code: PO4) (formula: O<sub>4</sub>P).



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

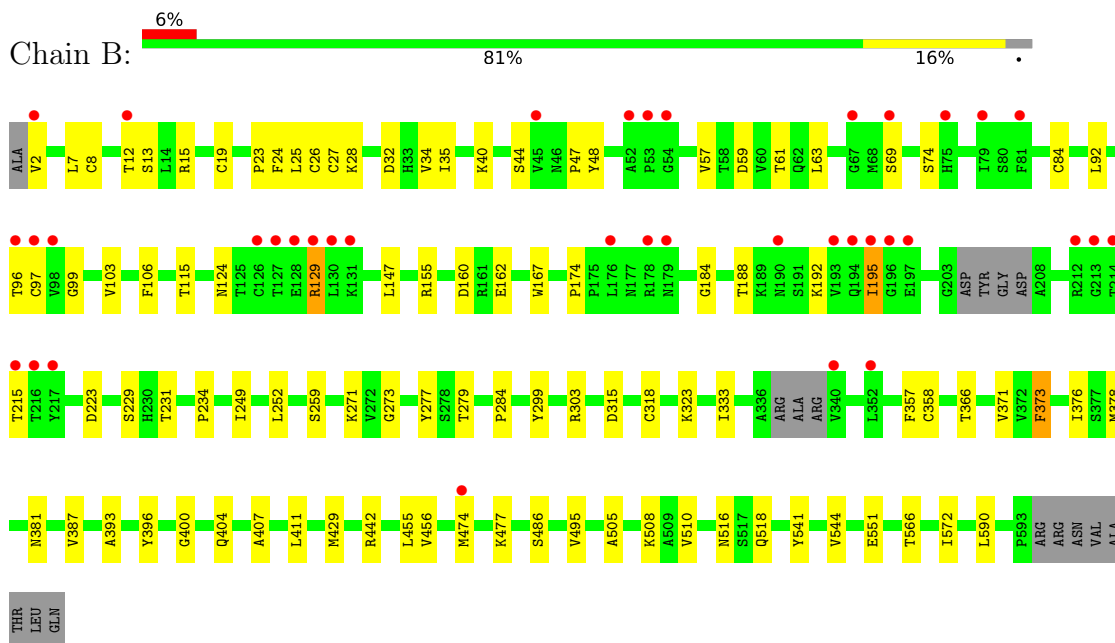
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	B	251	Total	O	0	0
			251	251		
5	A	203	Total	O	0	0
			203	203		

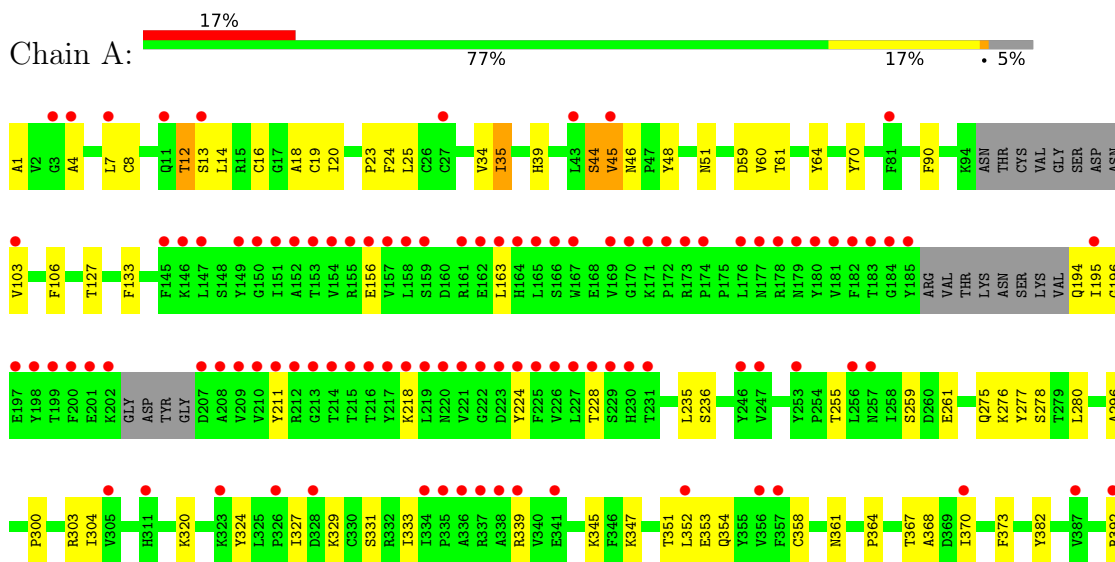
### 3 Residue-property plots i

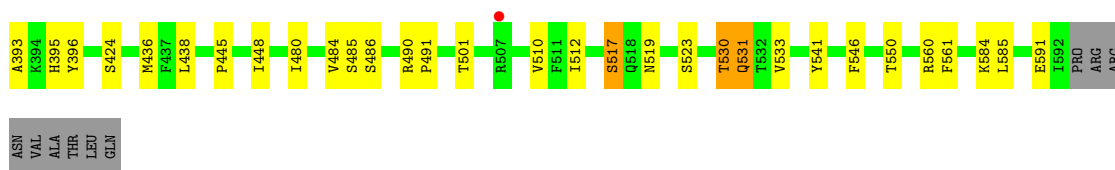
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Helicase



- Molecule 1: Helicase





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	59.15Å 70.28Å 85.59Å 102.73° 96.54° 112.33°	Depositor
Resolution (Å)	81.45 – 1.89 81.46 – 1.89	Depositor EDS
% Data completeness (in resolution range)	95.9 (81.45-1.89) 95.9 (81.46-1.89)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.08 (at 1.88Å)	Xtrriage
Refinement program	REFMAC 5.8.0258	Depositor
R, $R_{free}$	0.227 , 0.269 0.239 , 0.277	Depositor DCC
$R_{free}$ test set	4783 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	33.8	Xtrriage
Anisotropy	0.147	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 35.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	9433	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	52.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.79% 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: PO4, ZN, VVD

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	0.69	0/4517	0.81	0/6156
1	B	0.68	0/4610	0.84	0/6283
All	All	0.69	0/9127	0.83	0/12439

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	4417	0	4322	59	1
1	B	4508	0	4424	64	1
2	A	14	0	0	0	0
2	B	14	0	0	0	0
3	A	3	0	0	0	0
3	B	3	0	0	0	0
4	A	10	0	0	0	0
4	B	10	0	0	1	0
5	A	203	0	0	8	0
5	B	251	0	0	7	0
All	All	9433	0	8746	122	1

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 (122) 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:27:CYS:SG	5:B:839:HOH:O	1.93	1.21
1:B:12:THR:HG21	1:B:25:LEU:O	1.66	0.95
1:B:510:VAL:HG21	1:B:541:TYR:CD1	2.18	0.79
1:B:13:SER:O	1:B:44:SER:HA	1.85	0.77
1:B:508:LYS:HD3	5:B:995:HOH:O	1.86	0.75
1:A:584:LYS:NZ	5:A:802:HOH:O	2.18	0.72
1:B:8:CYS:SG	1:B:99:GLY:O	2.50	0.69
1:A:510:VAL:HG21	1:A:541:TYR:CD1	2.28	0.69
1:B:47:PRO:O	5:B:801:HOH:O	2.11	0.68
1:B:129:ARG:O	1:B:129:ARG:HD3	1.93	0.68
1:B:8:CYS:SG	1:B:99:GLY:N	2.70	0.65
1:A:368:ALA:O	1:A:393:ALA:HA	1.97	0.65
1:B:474[A]:MET:SD	1:B:495:VAL:HG11	2.37	0.65
1:A:486:SER:OG	1:A:517:SER:OG	2.07	0.64
1:A:275:GLN:O	1:A:395:HIS:ND1	2.29	0.64
1:A:7:LEU:HD13	1:A:103:VAL:HG22	1.80	0.63
1:A:339:ARG:NH2	5:A:808:HOH:O	2.31	0.63
1:B:184:GLY:C	1:B:195:ILE:HG22	2.19	0.62
1:A:320:LYS:NZ	5:A:811:HOH:O	2.32	0.62
1:A:7:LEU:HD21	1:A:106:PHE:HB2	1.82	0.62
1:A:261:GLU:OE1	1:A:324:TYR:OH	2.12	0.61
1:A:59:ASP:OD1	1:A:61:THR:OG1	2.15	0.61
1:B:7:LEU:HD21	1:B:106:PHE:HB2	1.85	0.59
1:B:271:LYS:NZ	5:B:807:HOH:O	2.32	0.59
1:B:315:ASP:O	1:B:318:CYS:HB2	2.04	0.57
1:B:7:LEU:CD1	1:B:103:VAL:HG22	2.35	0.57
1:A:44:SER:OG	1:A:45:VAL:N	2.37	0.57
1:A:16:CYS:SG	1:A:18:ALA:HB3	2.45	0.57
1:A:277:TYR:HA	1:A:396:TYR:O	2.04	0.57
1:A:64:TYR:O	1:A:70:TYR:HA	2.05	0.56
1:B:474[B]:MET:HG2	1:B:590:LEU:HB2	1.88	0.55
1:A:13:SER:OG	1:A:44:SER:HB2	2.06	0.55
1:A:235:LEU:HD21	1:A:382:TYR:CE2	2.42	0.54
1:B:8:CYS:SG	1:B:99:GLY:CA	2.96	0.54
1:B:333:ILE:HB	1:B:358:CYS:SG	2.48	0.54
1:B:279:THR:HB	1:B:429:MET:HE2	1.89	0.53
1:A:224:TYR:OH	5:A:801:HOH:O	2.07	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:34:VAL:HA	1:A:39:HIS:O	2.08	0.53
1:B:2:VAL:N	5:B:817:HOH:O	2.42	0.53
1:A:194:GLN:O	1:A:196:GLY:N	2.35	0.53
1:B:277:TYR:HA	1:B:396:TYR:O	2.11	0.51
1:A:327:ILE:HD11	1:A:345:LYS:O	2.09	0.51
1:B:48:TYR:O	5:B:803:HOH:O	2.19	0.51
1:B:376:ILE:HG21	1:B:429:MET:HE3	1.91	0.51
1:A:367:THR:HA	1:A:392:ARG:O	2.11	0.50
1:A:106:PHE:CE1	1:A:133:PHE:CE2	3.00	0.50
1:A:296:ALA:O	1:A:300:PRO:HA	2.11	0.50
1:A:304:ILE:HG12	1:A:370:ILE:HB	1.93	0.50
1:B:13:SER:HB2	1:B:92:LEU:HB2	1.94	0.49
1:B:323:LYS:O	1:B:323:LYS:HG2	2.13	0.49
1:A:4:ALA:O	1:A:24:PHE:HB2	2.13	0.48
1:A:519:ASN:HB3	1:A:530:THR:HG23	1.95	0.48
1:B:167:TRP:CZ3	1:B:174:PRO:HD2	2.48	0.48
1:B:28:LYS:O	1:B:32:ASP:OD1	2.30	0.48
1:A:20:ILE:HG22	5:A:888:HOH:O	2.13	0.48
1:B:252:LEU:HB3	1:B:299:TYR:CD1	2.49	0.48
1:B:249:ILE:HG23	1:B:273:GLY:HA3	1.96	0.47
1:A:512:ILE:O	1:A:546:PHE:HA	2.15	0.47
1:A:561:PHE:CZ	1:A:585:LEU:HD21	2.49	0.47
1:B:15:ARG:HG3	1:B:24:PHE:CD2	2.50	0.47
1:B:129:ARG:HD3	1:B:129:ARG:C	2.32	0.47
1:B:103:VAL:CG1	1:B:103:VAL:O	2.63	0.47
1:B:371:VAL:HG23	1:B:393:ALA:HB2	1.96	0.47
1:A:361:ASN:OD1	5:A:803:HOH:O	2.21	0.46
1:B:477:LYS:NZ	1:B:551:GLU:OE2	2.40	0.46
1:A:280:LEU:HD11	1:A:438:LEU:HG	1.98	0.46
1:A:35:ILE:O	1:A:35:ILE:HG12	2.16	0.46
1:A:12:THR:HG21	1:A:25:LEU:O	2.15	0.46
1:B:147:LEU:HD21	1:B:229:SER:OG	2.16	0.46
1:A:445:PRO:HD2	1:A:448:ILE:HD12	1.98	0.46
1:B:195:ILE:HG23	1:B:195:ILE:O	2.15	0.46
1:A:1:ALA:N	5:A:826:HOH:O	2.48	0.46
1:A:261:GLU:OE1	1:A:324:TYR:CZ	2.69	0.45
1:A:331:SER:HB2	1:A:353:GLU:HG3	1.98	0.45
1:B:234:PRO:CD	1:A:352:LEU:HD11	2.46	0.45
1:B:8:CYS:SG	1:B:99:GLY:C	2.94	0.45
1:B:61:THR:HG22	1:B:84:CYS:SG	2.57	0.44
1:A:19:CYS:HB2	1:A:23:PRO:HD2	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:13:SER:O	1:B:44:SER:CA	2.63	0.44
1:B:357:PHE:CD1	1:B:357:PHE:N	2.86	0.44
1:B:510:VAL:HG21	1:B:541:TYR:CG	2.53	0.44
1:A:331:SER:HA	1:A:347:LYS:O	2.18	0.44
1:B:124:ASN:OD1	1:B:381:ASN:ND2	2.48	0.43
1:B:19:CYS:HB2	1:B:23:PRO:HD2	2.00	0.43
1:B:376:ILE:HG22	1:B:400:GLY:HA3	1.99	0.43
1:B:373:PHE:CE1	1:B:387:VAL:HG21	2.54	0.43
1:A:163:LEU:HD23	1:A:211:TYR:CD2	2.53	0.43
1:B:57:VAL:HG12	1:B:63:LEU:HD21	2.00	0.43
1:A:512:ILE:HA	1:A:531:GLN:O	2.18	0.43
1:A:60:VAL:HB	5:A:929:HOH:O	2.20	0.42
1:B:516:ASN:ND2	5:B:831:HOH:O	2.52	0.42
1:A:276:LYS:O	1:A:395:HIS:HA	2.20	0.42
1:A:329:LYS:HE2	1:A:354:GLN:OE1	2.19	0.42
1:A:333:ILE:HB	1:A:358:CYS:SG	2.59	0.42
1:B:378:MET:O	1:B:407:ALA:HB2	2.20	0.42
1:A:351:THR:HG23	1:A:364:PRO:HG3	2.01	0.42
1:B:404:GLN:NE2	4:B:706:PO4:O2	2.47	0.42
1:B:12:THR:CG2	1:B:26:CYS:HA	2.50	0.42
1:B:455:LEU:HG	1:B:456:VAL:HG13	2.02	0.42
1:B:284:PRO:HG2	1:B:566:THR:HG21	2.02	0.41
1:B:505:ALA:O	1:B:508:LYS:HG2	2.20	0.41
1:B:518:GLN:HA	1:B:518:GLN:OE1	2.20	0.41
1:B:34:VAL:O	1:B:40:LYS:NZ	2.43	0.41
1:B:279:THR:HB	1:B:429:MET:CE	2.49	0.41
1:B:7:LEU:HD12	1:B:103:VAL:HG22	2.02	0.41
1:B:35:ILE:HD12	1:B:35:ILE:C	2.41	0.41
1:B:303:ARG:NH2	1:B:366:THR:OG1	2.53	0.41
1:A:48:TYR:OH	1:A:90:PHE:O	2.23	0.41
1:A:303:ARG:NH1	1:A:353:GLU:O	2.53	0.41
1:B:103:VAL:O	1:B:103:VAL:HG13	2.21	0.41
1:A:275:GLN:O	1:A:395:HIS:CE1	2.73	0.41
1:A:490:ARG:HB2	1:A:491:PRO:HD3	2.03	0.41
1:B:115:THR:HA	1:B:411:LEU:O	2.20	0.41
1:A:12:THR:HG22	1:A:14:LEU:H	1.86	0.41
1:A:519:ASN:HB3	1:A:530:THR:CG2	2.51	0.41
1:A:533:VAL:HG11	1:A:560:ARG:O	2.21	0.41
1:A:353:GLU:OE2	1:A:353:GLU:HA	2.21	0.41
1:A:480:ILE:HG21	1:A:550:THR:HG22	2.03	0.41
1:B:59:ASP:C	1:B:59:ASP:OD1	2.59	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:486:SER:CB	1:A:517:SER:OG	2.70	0.40
1:B:544:VAL:O	1:B:572:ILE:HA	2.21	0.40
1:A:278:SER:HB2	1:A:436:MET:CE	2.51	0.40

All (1) 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)
1:B:442:ARG:NH1	1:A:501:THR:O[1_666]	2.13	0.07

## 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	564/601 (94%)	528 (94%)	31 (6%)	5 (1%)	17 7
1	B	580/601 (96%)	545 (94%)	34 (6%)	1 (0%)	47 38
All	All	1144/1202 (95%)	1073 (94%)	65 (6%)	6 (0%)	29 18

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	195	ILE
1	A	218	LYS
1	A	484	VAL
1	A	228	THR
1	A	45	VAL
1	B	195	ILE

### 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	485/523 (93%)	466 (96%)	19 (4%)	32	23
1	B	498/523 (95%)	482 (97%)	16 (3%)	39	30
All	All	983/1046 (94%)	948 (96%)	35 (4%)	35	26

All (35) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	69	SER
1	B	74	SER
1	B	96	THR
1	B	97	CYS
1	B	129	ARG
1	B	155	ARG
1	B	160	ASP
1	B	162	GLU
1	B	188	THR
1	B	192	LYS
1	B	215	THR
1	B	223	ASP
1	B	231	THR
1	B	259	SER
1	B	373	PHE
1	B	486	SER
1	A	8	CYS
1	A	12	THR
1	A	35	ILE
1	A	44	SER
1	A	46	ASN
1	A	51	ASN
1	A	127	THR
1	A	156	GLU
1	A	236	SER
1	A	255	THR
1	A	259	SER

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Mol	Chain	Res	Type
1	A	373	PHE
1	A	424	SER
1	A	485	SER
1	A	517	SER
1	A	523	SER
1	A	530	THR
1	A	531	GLN
1	A	591	GLU

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

Mol	Chain	Res	Type
1	B	88	GLN
1	B	179	ASN
1	B	516	ASN
1	A	86	ASN
1	A	179	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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 12 ligands modelled in this entry, 6 are monoatomic - leaving 6 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	$\# Z  > 2$
4	PO4	A	706	-	4,4,4	1.32	0	6,6,6	0.45	0
4	PO4	B	705	-	4,4,4	0.51	0	6,6,6	0.54	0
4	PO4	B	706	-	4,4,4	1.34	1 (25%)	6,6,6	0.61	0
2	VVD	B	701	-	14,14,14	0.69	0	19,19,19	0.59	0
4	PO4	A	705	-	4,4,4	0.78	0	6,6,6	0.45	0
2	VVD	A	701	-	14,14,14	0.55	0	19,19,19	0.72	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	VVD	B	701	-	-	2/8/8/8	0/1/1/1
2	VVD	A	701	-	-	6/8/8/8	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	706	PO4	P-O3	-2.10	1.48	1.54

There are no bond angle outliers.

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	701	VVD	C1-C2-N1-C3
2	B	701	VVD	O1-C2-N1-C3
2	A	701	VVD	C6-C7-C9-O2
2	A	701	VVD	C6-C7-C9-O3
2	A	701	VVD	C4-C3-N1-C2
2	A	701	VVD	C8-C7-C9-O3
2	A	701	VVD	C8-C7-C9-O2
2	A	701	VVD	C8-C3-N1-C2

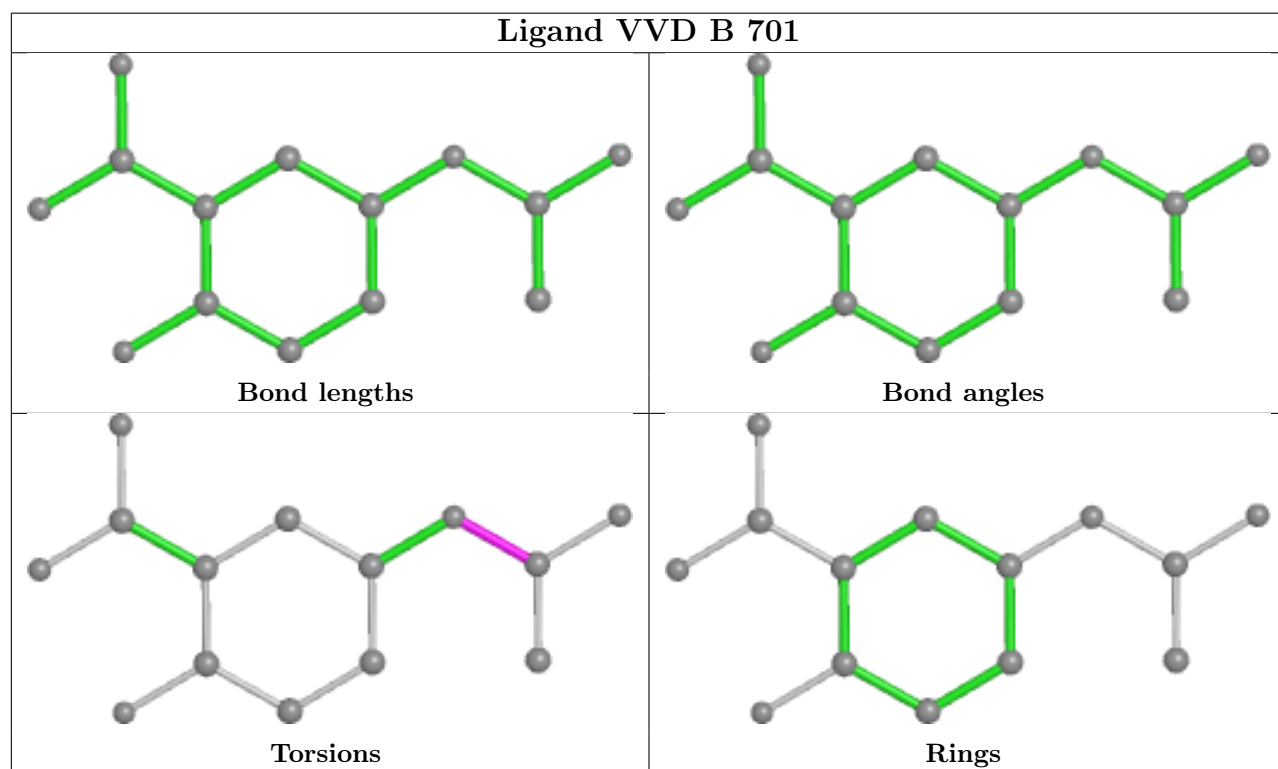
There are no ring outliers.

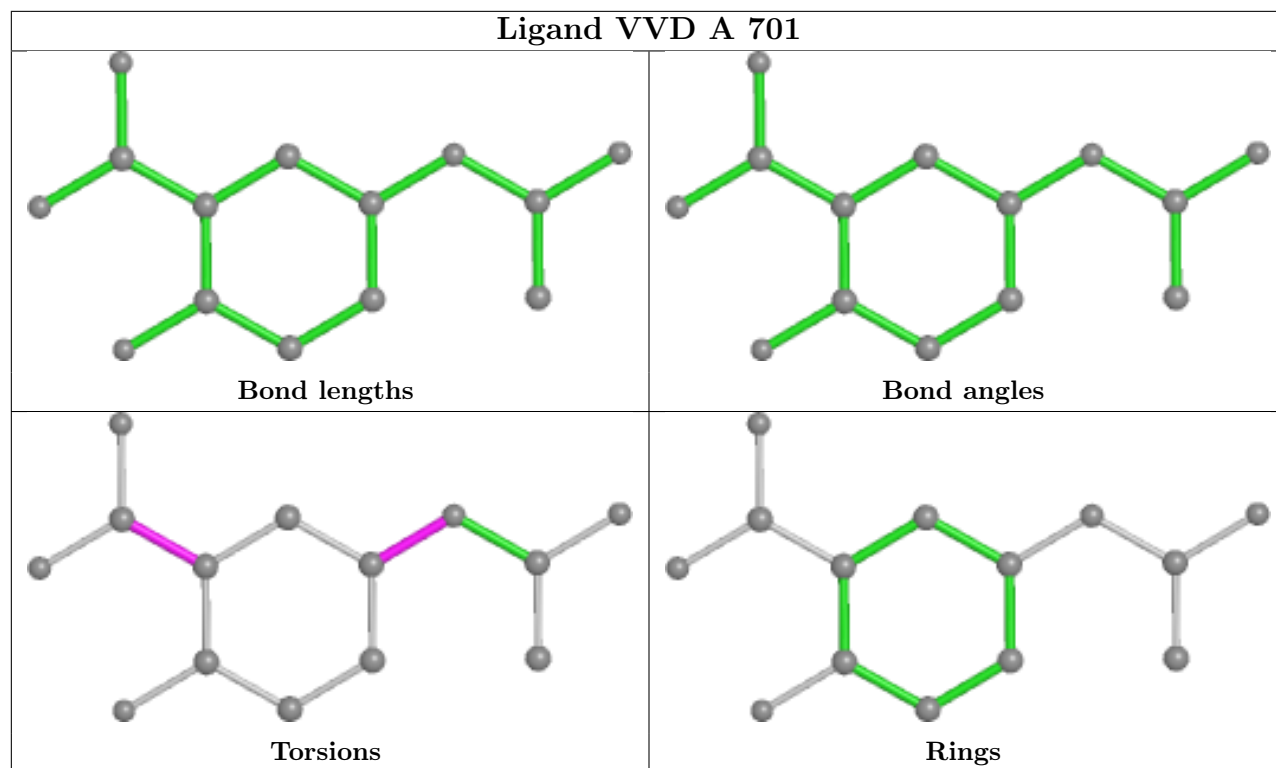
1 monomer is involved in 1 short contact:



Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	706	PO4	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 [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, 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	572/601 (95%)	1.16	103 (18%) <b>1</b> <b>1</b>	24, 50, 134, 175	0
1	B	585/601 (97%)	0.24	38 (6%) <b>18</b> <b>21</b>	19, 39, 84, 131	7 (1%)
All	All	1157/1202 (96%)	0.69	141 (12%) <b>4</b> <b>4</b>	19, 45, 114, 175	7 (0%)

All (141) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	178	ARG	17.2
1	A	149	TYR	16.6
1	A	215	THR	15.4
1	A	216	THR	14.0
1	A	176	LEU	13.7
1	A	152	ALA	13.3
1	A	167	TRP	13.0
1	A	208	ALA	12.9
1	A	179	ASN	12.6
1	A	177	ASN	11.4
1	A	221	VAL	11.0
1	A	157	VAL	10.9
1	A	202	LYS	10.4
1	A	200	PHE	10.3
1	A	229	SER	9.8
1	B	217	TYR	9.6
1	A	154	VAL	9.1
1	B	193	VAL	9.0
1	B	214	THR	8.9
1	A	153	THR	8.8
1	A	170	GLY	8.6
1	A	209	VAL	8.1
1	A	182	PHE	7.9
1	A	207	ASP	7.5

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	336	ALA	7.4
1	A	214	THR	7.2
1	A	181	VAL	6.8
1	A	225	PHE	6.7
1	A	217	TYR	6.6
1	A	158	LEU	6.6
1	A	219	LEU	6.6
1	A	228	THR	6.5
1	A	169	VAL	6.5
1	A	184	GLY	6.4
1	A	210	VAL	6.2
1	A	174	PRO	6.0
1	B	126	CYS	6.0
1	A	227	LEU	6.0
1	A	211	TYR	5.9
1	B	213	GLY	5.8
1	A	146	LYS	5.7
1	B	194	GLN	5.5
1	A	180	TYR	5.5
1	A	224	TYR	5.2
1	A	230	HIS	5.1
1	A	223	ASP	5.0
1	B	130	LEU	5.0
1	B	474[A]	MET	5.0
1	A	164	HIS	5.0
1	A	195	ILE	4.9
1	A	339	ARG	4.9
1	A	257	ASN	4.8
1	A	166	SER	4.7
1	A	199	THR	4.6
1	A	305	VAL	4.6
1	A	156	GLU	4.6
1	B	127	THR	4.6
1	B	340	VAL	4.5
1	A	198	TYR	4.4
1	A	220	ASN	4.4
1	B	212	ARG	4.4
1	B	215	THR	4.3
1	A	171	LYS	4.2
1	A	185	TYR	4.2
1	A	165	LEU	4.1
1	A	335	PRO	4.1

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	195	ILE	4.0
1	A	161	ARG	4.0
1	A	45	VAL	4.0
1	A	338	ALA	4.0
1	B	190	ASN	4.0
1	A	352	LEU	3.8
1	A	151	ILE	3.7
1	B	96	THR	3.7
1	A	162	GLU	3.7
1	A	163	LEU	3.7
1	B	196	GLY	3.7
1	A	246	TYR	3.6
1	A	226	VAL	3.6
1	A	7	LEU	3.6
1	A	387	VAL	3.6
1	B	179	ASN	3.4
1	B	45	VAL	3.4
1	A	172	PRO	3.3
1	A	356	VAL	3.2
1	A	247	VAL	3.1
1	A	334	ILE	3.1
1	B	129	ARG	3.1
1	B	2	VAL	3.0
1	A	173	ARG	3.0
1	B	131	LYS	3.0
1	B	97	CYS	2.9
1	B	81	PHE	2.9
1	B	67	GLY	2.9
1	A	145	PHE	2.8
1	A	341	GLU	2.8
1	B	12	THR	2.8
1	A	11	GLN	2.8
1	A	103	VAL	2.7
1	B	79	ILE	2.7
1	A	155	ARG	2.6
1	A	311	HIS	2.6
1	A	213	GLY	2.6
1	A	13	SER	2.5
1	B	53	PRO	2.5
1	B	98	VAL	2.5
1	A	256	LEU	2.5
1	A	357	PHE	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	176	LEU	2.4
1	A	81	PHE	2.4
1	A	253	TYR	2.4
1	B	128	GLU	2.4
1	B	216	THR	2.4
1	A	183	THR	2.4
1	A	27	CYS	2.4
1	A	201	GLU	2.4
1	A	392	ARG	2.3
1	B	197	GLU	2.3
1	A	197	GLU	2.3
1	B	75	HIS	2.3
1	A	222	GLY	2.3
1	A	218	LYS	2.3
1	A	3	GLY	2.3
1	A	159	SER	2.3
1	A	212	ARG	2.3
1	A	150	GLY	2.2
1	A	326	PRO	2.1
1	B	352	LEU	2.1
1	B	52	ALA	2.1
1	B	69	SER	2.1
1	B	178	ARG	2.1
1	B	54	GLY	2.1
1	A	507	ARG	2.1
1	A	4	ALA	2.1
1	A	370	ILE	2.1
1	A	147	LEU	2.1
1	A	231	THR	2.0
1	A	328	ASP	2.0
1	A	337	ARG	2.0
1	A	43	LEU	2.0
1	A	323	LYS	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

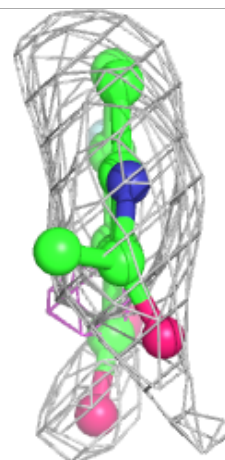
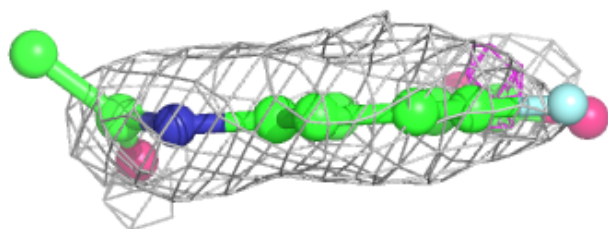
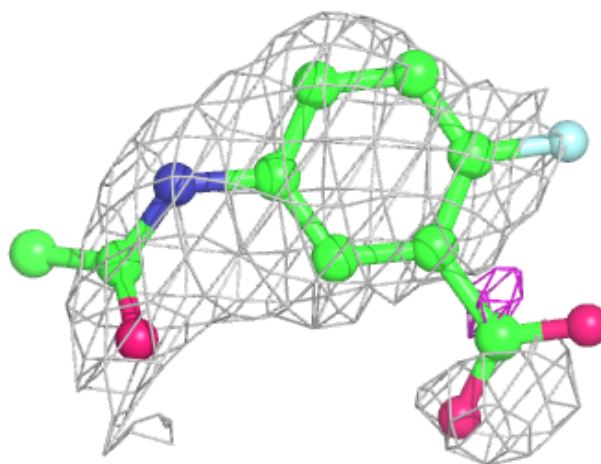
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q<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
2	VVD	B	701	14/14	0.73	0.26	71,82,94,96	0
2	VVD	A	701	14/14	0.85	0.12	52,59,64,66	0
3	ZN	A	704	1/1	0.88	0.07	79,79,79,79	0
3	ZN	A	703	1/1	0.93	0.09	54,54,54,54	0
3	ZN	B	704	1/1	0.94	0.07	72,72,72,72	0
4	PO4	B	705	5/5	0.97	0.12	38,40,42,44	0
4	PO4	B	706	5/5	0.97	0.13	35,36,38,49	0
3	ZN	B	703	1/1	0.98	0.07	52,52,52,52	0
4	PO4	A	706	5/5	0.98	0.10	30,36,38,43	0
3	ZN	A	702	1/1	0.99	0.10	44,44,44,44	0
4	PO4	A	705	5/5	0.99	0.10	34,35,40,41	0
3	ZN	B	702	1/1	0.99	0.09	36,36,36,36	0

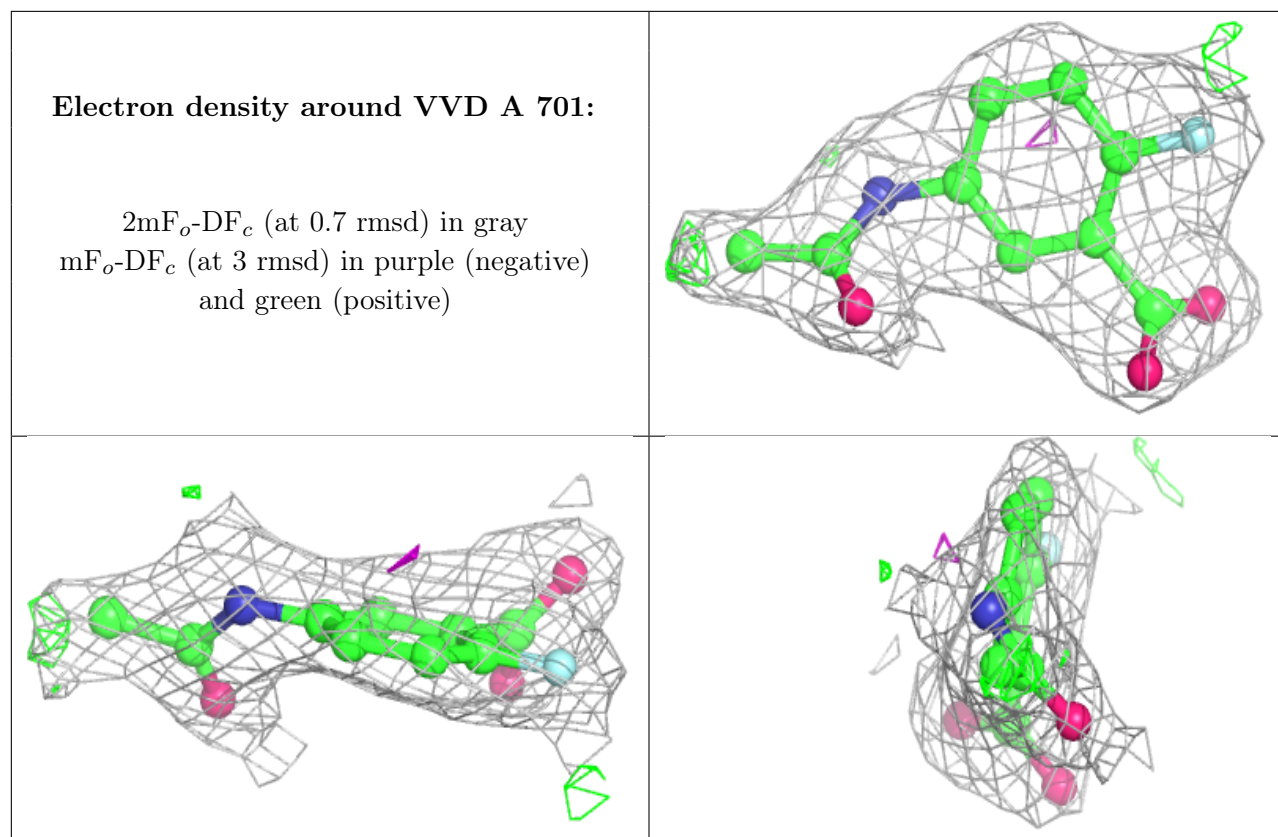
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

**Electron density around VVD B 701:**

$2mF_o-DF_c$  (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.