



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 10:47 PM UTC

PDB ID : 6CSW / pdb_00006csw
Title : Crystal Structure of the Human vaccinia-related kinase bound to a N-methyl-N-propyl-dihydropteridine inhibitor
Authors : dos Reis, C.V.; de Souza, G.P.; Counago, R.M.; Chiodi, C.G.; Azevedo, A.; Guimaraes, C.; Mascarello, A.; Gama, F.; Ferreira, M.; Massirer, K.B.; Arruda, P.; Edwards, A.M.; Elkins, J.M.; Structural Genomics Consortium (SGC)
Deposited on : 2018-03-21
Resolution : 2.25 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)

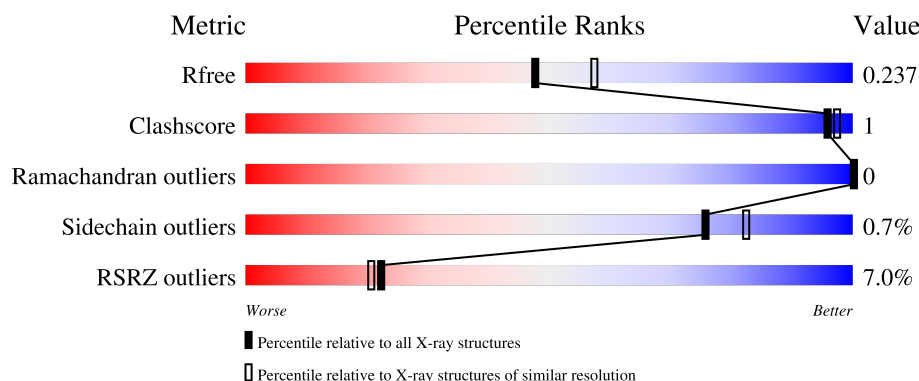
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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	1898 (2.26-2.26)
Clashscore	190562	2005 (2.26-2.26)
Ramachandran outliers	187476	1965 (2.26-2.26)
Sidechain outliers	187428	1966 (2.26-2.26)
RSRZ outliers	180081	1898 (2.26-2.26)

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	364	4% 82% 13%
1	B	364	9% 83% 15%
1	C	364	4% 84% 12%

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Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

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Mol	Chain	Length	Quality of chain
1	D	364	7% 83% • 14%

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 10829 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 Serine/threonine-protein kinase VRK1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	316	Total	C	N	O	S	0	4	0
			2534	1616	430	475	13			
1	B	308	Total	C	N	O	S	0	3	0
			2459	1576	428	443	12			
1	C	319	Total	C	N	O	S	0	5	0
			2562	1634	441	474	13			
1	D	312	Total	C	N	O	S	0	4	0
			2490	1592	424	461	13			

There are 52 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	SER	-	expression tag	UNP Q99986
A	2	MET	-	expression tag	UNP Q99986
A	34	ALA	LYS	engineered mutation	UNP Q99986
A	35	ALA	LYS	engineered mutation	UNP Q99986
A	36	ALA	GLU	engineered mutation	UNP Q99986
A	212	ALA	GLU	engineered mutation	UNP Q99986
A	214	ALA	LYS	engineered mutation	UNP Q99986
A	215	ALA	GLU	engineered mutation	UNP Q99986
A	292	ALA	GLU	engineered mutation	UNP Q99986
A	293	ALA	LYS	engineered mutation	UNP Q99986
A	295	ALA	LYS	engineered mutation	UNP Q99986
A	359	ALA	LYS	engineered mutation	UNP Q99986
A	360	ALA	LYS	engineered mutation	UNP Q99986
B	1	SER	-	expression tag	UNP Q99986
B	2	MET	-	expression tag	UNP Q99986
B	34	ALA	LYS	engineered mutation	UNP Q99986
B	35	ALA	LYS	engineered mutation	UNP Q99986
B	36	ALA	GLU	engineered mutation	UNP Q99986
B	212	ALA	GLU	engineered mutation	UNP Q99986
B	214	ALA	LYS	engineered mutation	UNP Q99986
B	215	ALA	GLU	engineered mutation	UNP Q99986

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Chain	Residue	Modelled	Actual	Comment	Reference
B	292	ALA	GLU	engineered mutation	UNP Q99986
B	293	ALA	LYS	engineered mutation	UNP Q99986
B	295	ALA	LYS	engineered mutation	UNP Q99986
B	359	ALA	LYS	engineered mutation	UNP Q99986
B	360	ALA	LYS	engineered mutation	UNP Q99986
C	1	SER	-	expression tag	UNP Q99986
C	2	MET	-	expression tag	UNP Q99986
C	34	ALA	LYS	engineered mutation	UNP Q99986
C	35	ALA	LYS	engineered mutation	UNP Q99986
C	36	ALA	GLU	engineered mutation	UNP Q99986
C	212	ALA	GLU	engineered mutation	UNP Q99986
C	214	ALA	LYS	engineered mutation	UNP Q99986
C	215	ALA	GLU	engineered mutation	UNP Q99986
C	292	ALA	GLU	engineered mutation	UNP Q99986
C	293	ALA	LYS	engineered mutation	UNP Q99986
C	295	ALA	LYS	engineered mutation	UNP Q99986
C	359	ALA	LYS	engineered mutation	UNP Q99986
C	360	ALA	LYS	engineered mutation	UNP Q99986
D	1	SER	-	expression tag	UNP Q99986
D	2	MET	-	expression tag	UNP Q99986
D	34	ALA	LYS	engineered mutation	UNP Q99986
D	35	ALA	LYS	engineered mutation	UNP Q99986
D	36	ALA	GLU	engineered mutation	UNP Q99986
D	212	ALA	GLU	engineered mutation	UNP Q99986
D	214	ALA	LYS	engineered mutation	UNP Q99986
D	215	ALA	GLU	engineered mutation	UNP Q99986
D	292	ALA	GLU	engineered mutation	UNP Q99986
D	293	ALA	LYS	engineered mutation	UNP Q99986
D	295	ALA	LYS	engineered mutation	UNP Q99986
D	359	ALA	LYS	engineered mutation	UNP Q99986
D	360	ALA	LYS	engineered mutation	UNP Q99986

- Molecule 2 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



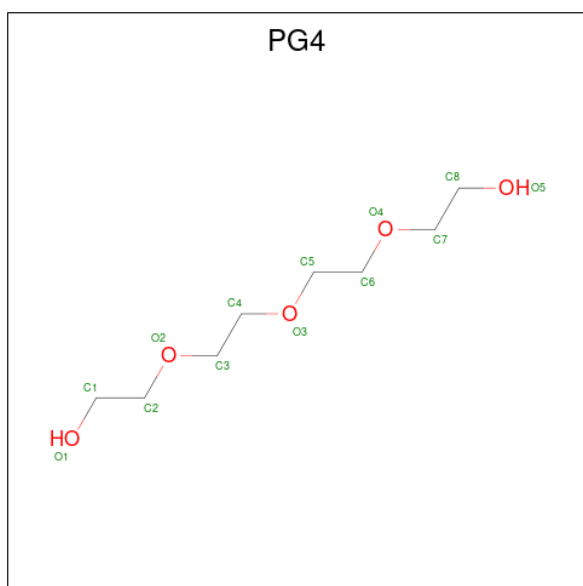
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	C	1	Total	O	S	0	0
			5	4	1		
2	C	1	Total	O	S	0	0
			5	4	1		
2	C	1	Total	O	S	0	0
			5	4	1		
2	D	1	Total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

- Molecule 3 is ACETATE ION (CCD ID: ACT) (formula: $\text{C}_2\text{H}_3\text{O}_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			4	2	2		
3	D	1	Total	C	O	0	0
			4	2	2		

- Molecule 4 is TETRAETHYLENE GLYCOL (CCD ID: PG4) (formula: $\text{C}_8\text{H}_{18}\text{O}_5$).



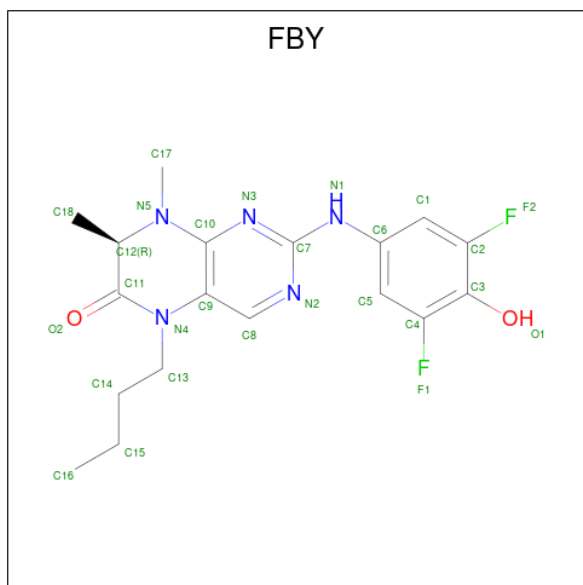
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			13	8	5		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			13	8	5		

- Molecule 5 is (7R)-5-butyl-2-[(3,5-difluoro-4-hydroxyphenyl)amino]-7,8-dimethyl-7,8-dihydropteridin-6(5H)-one (CCD ID: FBY) (formula: C₁₈H₂₁F₂N₅O₂).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	B	1	Total	C	F	N	O	0	0
			27	18	2	5	2		
5	D	1	Total	C	F	N	O	0	0
			27	18	2	5	2		

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



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

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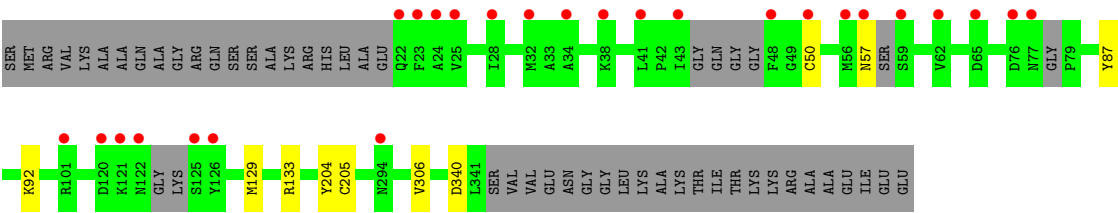
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	D	1	Total	C	O	0	0
			6	3	3		

- Molecule 7 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	C	1	Total	Cl	0	0
			1	1		
7	D	1	Total	Cl	0	0
			1	1		

- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	134	Total	O	0	0
			134	134		
8	B	108	Total	O	0	0
			108	108		
8	C	166	Total	O	0	0
			166	166		
8	D	126	Total	O	0	0
			126	126		



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	91.83Å 96.99Å 191.67Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	34.80 – 2.25 34.80 – 2.25	Depositor EDS
% Data completeness (in resolution range)	100.0 (34.80-2.25) 100.0 (34.80-2.25)	Depositor EDS
R_{merge}	0.19	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.88 (at 2.24Å)	Xtriage
Refinement program	REFMAC 5.8.0218	Depositor
R, R_{free}	0.188 , 0.233 0.195 , 0.237	Depositor DCC
R_{free} test set	3987 reflections (4.87%)	wwPDB-VP
Wilson B-factor (Å ²)	26.6	Xtriage
Anisotropy	0.973	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 47.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	10829	wwPDB-VP
Average B, all atoms (Å ²)	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.16% 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, CL, PG4, ACT, GOL, FBY

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	0.65	0/2596	0.80	1/3519 (0.0%)
1	B	0.61	0/2517	0.79	1/3402 (0.0%)
1	C	0.64	0/2623	0.81	1/3549 (0.0%)
1	D	0.65	0/2549	0.83	2/3452 (0.1%)
All	All	0.64	0/10285	0.81	5/13922 (0.0%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	89	ARG	N-CA-C	6.22	118.14	111.36
1	D	92	LYS	CA-C-N	5.78	125.25	119.24
1	D	92	LYS	C-N-CA	5.78	125.25	119.24
1	C	225	ILE	N-CA-C	5.45	116.08	110.36
1	B	66	ALA	N-CA-C	5.02	116.21	109.83

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	2534	0	2452	8	0
1	B	2459	0	2408	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	2562	0	2502	8	0
1	D	2490	0	2395	5	0
2	A	10	0	0	0	0
2	B	15	0	0	0	0
2	C	15	0	0	0	0
2	D	30	0	0	0	0
3	A	4	0	3	0	0
3	D	4	0	3	0	0
4	A	26	0	36	0	0
5	B	27	0	0	0	0
5	D	27	0	0	0	0
6	B	24	0	32	0	0
6	C	24	0	32	0	0
6	D	42	0	56	2	0
7	C	1	0	0	1	0
7	D	1	0	0	0	0
8	A	134	0	0	0	0
8	B	108	0	0	0	0
8	C	166	0	0	0	0
8	D	126	0	0	0	0
All	All	10829	0	9919	23	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 1.

All (23) 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:252:ILE:HD11	1:A:303:MET:HE1	1.72	0.70
1:A:51:ILE:HG12	1:A:71:LYS:HG2	1.73	0.68
1:B:32:MET:HA	1:B:32:MET:HE2	1.76	0.67
1:A:252:ILE:CD1	1:A:303:MET:HE1	2.24	0.66
1:C:267:ASP:OD1	1:C:269:LYS:HG2	2.08	0.54
1:C:204:TYR:CE2	1:C:205:CYS:HB2	2.44	0.53
1:C:200:LEU:HD13	1:C:221:HIS:HB2	1.90	0.53
1:D:306:VAL:HG12	6:D:410:GOL:H11	1.92	0.50
1:D:204:TYR:CE2	1:D:205:CYS:HB2	2.48	0.49
1:D:306:VAL:HG12	6:D:410:GOL:C1	2.43	0.48
1:D:133:ARG:HD3	1:D:133:ARG:C	2.39	0.48
1:C:87:TYR:HB3	1:C:113:TYR:HB2	1.96	0.47
1:C:239:SER:N	7:C:408:CL:CL	2.84	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:62:VAL:CG1	1:C:66:ALA:HB2	2.47	0.45
1:A:43:ILE:HG13	1:A:43:ILE:O	2.17	0.45
1:A:291:PRO:O	1:A:292:ALA:C	2.60	0.44
1:C:186:ASN:HB3	1:C:189:ASN:O	2.18	0.43
1:A:87:TYR:HB3	1:A:113:TYR:HB2	2.00	0.42
1:A:166:GLU:HG3	1:A:317:TYR:CD2	2.54	0.42
1:C:200:LEU:HD13	1:C:221:HIS:CG	2.55	0.42
1:B:109:GLY:HA3	1:B:164:ILE:HD11	2.02	0.41
1:D:87:TYR:CD2	1:D:129:MET:HE1	2.55	0.41
1:A:38:LYS:HE3	1:A:58:SER:O	2.22	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	316/364 (87%)	305 (96%)	11 (4%)	0	100	100
1	B	301/364 (83%)	285 (95%)	16 (5%)	0	100	100
1	C	318/364 (87%)	310 (98%)	8 (2%)	0	100	100
1	D	306/364 (84%)	295 (96%)	11 (4%)	0	100	100
All	All	1241/1456 (85%)	1195 (96%)	46 (4%)	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	264/304 (87%)	262 (99%)	2 (1%)	73	80
1	B	250/304 (82%)	249 (100%)	1 (0%)	84	89
1	C	267/304 (88%)	266 (100%)	1 (0%)	84	89
1	D	255/304 (84%)	252 (99%)	3 (1%)	63	74
All	All	1036/1216 (85%)	1029 (99%)	7 (1%)	76	82

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	50	CYS
1	A	222	ASP
1	B	57	ASN
1	C	50	CYS
1	D	50	CYS
1	D	57	ASN
1	D	340	ASP

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	97	GLN
1	C	22	GLN
1	C	119	HIS

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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 37 ligands modelled in this entry, 2 are monoatomic - leaving 35 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	$\# Z > 2$
6	GOL	C	407	-	5,5,5	0.40	0	5,5,5	0.26	0
5	FBY	D	401	-	29,29,29	0.58	0	36,42,42	1.07	4 (11%)
6	GOL	B	407	-	5,5,5	0.40	0	5,5,5	0.59	0
2	SO4	D	402	-	4,4,4	0.42	0	6,6,6	0.25	0
2	SO4	C	402	-	4,4,4	0.43	0	6,6,6	0.16	0
2	SO4	D	407	-	4,4,4	0.43	0	6,6,6	0.10	0
6	GOL	D	413	-	5,5,5	0.37	0	5,5,5	0.33	0
6	GOL	D	412	-	5,5,5	0.47	0	5,5,5	0.50	0
2	SO4	B	402	-	4,4,4	0.49	0	6,6,6	0.15	0
6	GOL	D	410	-	5,5,5	0.36	0	5,5,5	0.32	0
6	GOL	D	414	-	5,5,5	0.41	0	5,5,5	0.22	0
6	GOL	B	405	-	5,5,5	0.25	0	5,5,5	0.24	0
6	GOL	D	411	-	5,5,5	0.44	0	5,5,5	0.28	0
6	GOL	C	404	-	5,5,5	0.20	0	5,5,5	0.34	0
2	SO4	D	405	-	4,4,4	0.44	0	6,6,6	0.21	0
3	ACT	D	415	-	3,3,3	0.76	0	3,3,3	0.89	0
2	SO4	B	404	-	4,4,4	0.42	0	6,6,6	0.23	0
2	SO4	B	403	-	4,4,4	0.42	0	6,6,6	0.18	0
2	SO4	C	403	-	4,4,4	0.44	0	6,6,6	0.13	0
6	GOL	B	408	-	5,5,5	0.24	0	5,5,5	0.28	0
3	ACT	A	403	-	3,3,3	0.79	0	3,3,3	0.70	0
6	GOL	D	408	-	5,5,5	0.33	0	5,5,5	0.30	0
4	PG4	A	404	-	12,12,12	0.54	0	11,11,11	0.24	0
2	SO4	D	404	-	4,4,4	0.47	0	6,6,6	0.16	0
2	SO4	D	403	-	4,4,4	0.44	0	6,6,6	0.15	0
2	SO4	A	401	-	4,4,4	0.44	0	6,6,6	0.17	0
2	SO4	A	402	-	4,4,4	0.49	0	6,6,6	0.06	0
6	GOL	D	409	-	5,5,5	0.32	0	5,5,5	0.27	0
2	SO4	D	406	-	4,4,4	0.44	0	6,6,6	0.22	0
4	PG4	A	405	-	12,12,12	0.61	0	11,11,11	0.35	0
5	FBY	B	401	-	29,29,29	0.58	0	36,42,42	1.08	3 (8%)
6	GOL	B	406	-	5,5,5	0.26	0	5,5,5	0.28	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	GOL	C	405	-	5,5,5	0.31	0	5,5,5	0.39	0
2	SO4	C	401	-	4,4,4	0.48	0	6,6,6	0.19	0
6	GOL	C	406	-	5,5,5	0.39	0	5,5,5	0.24	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
6	GOL	C	407	-	-	3/4/4/4	-
5	FBY	D	401	-	-	2/8/28/28	0/3/3/3
6	GOL	B	407	-	-	2/4/4/4	-
6	GOL	D	413	-	-	2/4/4/4	-
6	GOL	D	412	-	-	4/4/4/4	-
6	GOL	D	410	-	-	2/4/4/4	-
6	GOL	D	414	-	-	2/4/4/4	-
6	GOL	B	405	-	-	0/4/4/4	-
6	GOL	D	411	-	-	3/4/4/4	-
6	GOL	C	404	-	-	1/4/4/4	-
6	GOL	B	408	-	-	0/4/4/4	-
6	GOL	D	408	-	-	0/4/4/4	-
4	PG4	A	404	-	-	4/10/10/10	-
6	GOL	D	409	-	-	2/4/4/4	-
4	PG4	A	405	-	-	4/10/10/10	-
5	FBY	B	401	-	-	3/8/28/28	0/3/3/3
6	GOL	B	406	-	-	0/4/4/4	-
6	GOL	C	405	-	-	0/4/4/4	-
6	GOL	C	406	-	-	3/4/4/4	-

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	401	FBY	F2-C2-C3	2.58	119.00	117.13
5	B	401	FBY	C1-C2-C3	-2.48	121.85	123.79
5	D	401	FBY	C1-C2-C3	-2.39	121.92	123.79
5	D	401	FBY	C5-C4-C3	-2.36	121.94	123.79
5	B	401	FBY	C5-C4-C3	-2.21	122.06	123.79

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	D	401	FBY	F2-C2-C3	2.13	118.67	117.13
5	D	401	FBY	F1-C4-C3	2.09	118.64	117.13

There are no chirality outliers.

All (37) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	B	407	GOL	C1-C2-C3-O3
6	C	406	GOL	O1-C1-C2-C3
6	C	407	GOL	C1-C2-C3-O3
6	D	409	GOL	C1-C2-C3-O3
6	D	410	GOL	C1-C2-C3-O3
6	D	411	GOL	O1-C1-C2-C3
6	D	412	GOL	O1-C1-C2-C3
6	D	414	GOL	O1-C1-C2-C3
5	B	401	FBY	N2-C7-N1-C6
5	B	401	FBY	N3-C7-N1-C6
6	D	411	GOL	O1-C1-C2-O2
6	D	412	GOL	C1-C2-C3-O3
6	D	413	GOL	C1-C2-C3-O3
4	A	405	PG4	O1-C1-C2-O2
6	B	407	GOL	O2-C2-C3-O3
6	C	406	GOL	O1-C1-C2-O2
6	D	409	GOL	O2-C2-C3-O3
6	D	410	GOL	O2-C2-C3-O3
6	D	412	GOL	O1-C1-C2-O2
6	D	414	GOL	O1-C1-C2-O2
6	D	412	GOL	O2-C2-C3-O3
6	D	411	GOL	C1-C2-C3-O3
6	C	407	GOL	O2-C2-C3-O3
6	D	413	GOL	O2-C2-C3-O3
5	D	401	FBY	N3-C7-N1-C6
6	C	407	GOL	O1-C1-C2-O2
4	A	404	PG4	C8-C7-O4-C6
5	D	401	FBY	N2-C7-N1-C6
4	A	405	PG4	C1-C2-O2-C3
4	A	405	PG4	C8-C7-O4-C6
4	A	404	PG4	O2-C3-C4-O3
4	A	404	PG4	C6-C5-O3-C4
4	A	405	PG4	O4-C7-C8-O5
5	B	401	FBY	N4-C13-C14-C15
6	C	406	GOL	C1-C2-C3-O3

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Mol	Chain	Res	Type	Atoms
6	C	404	GOL	O1-C1-C2-O2
4	A	404	PG4	C1-C2-O2-C3

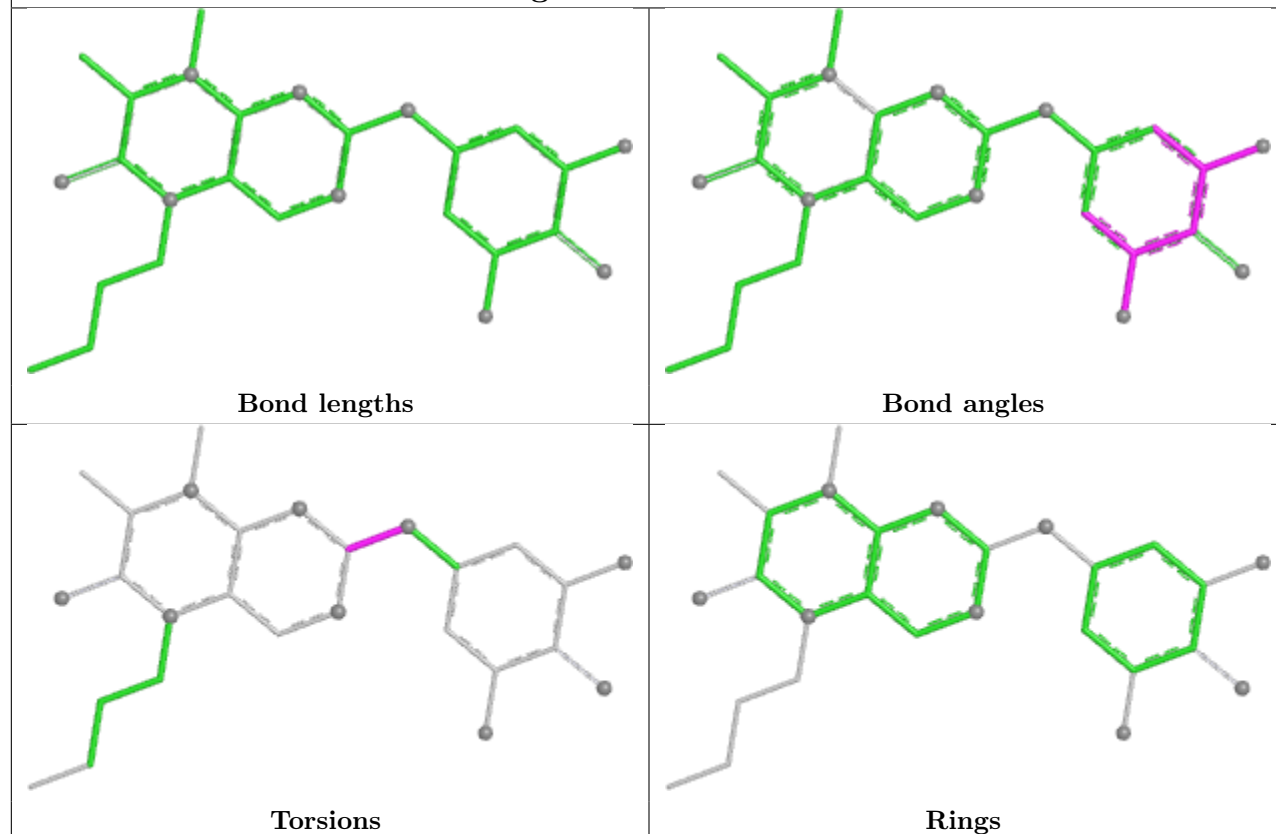
There are no ring outliers.

1 monomer is involved in 2 short contacts:

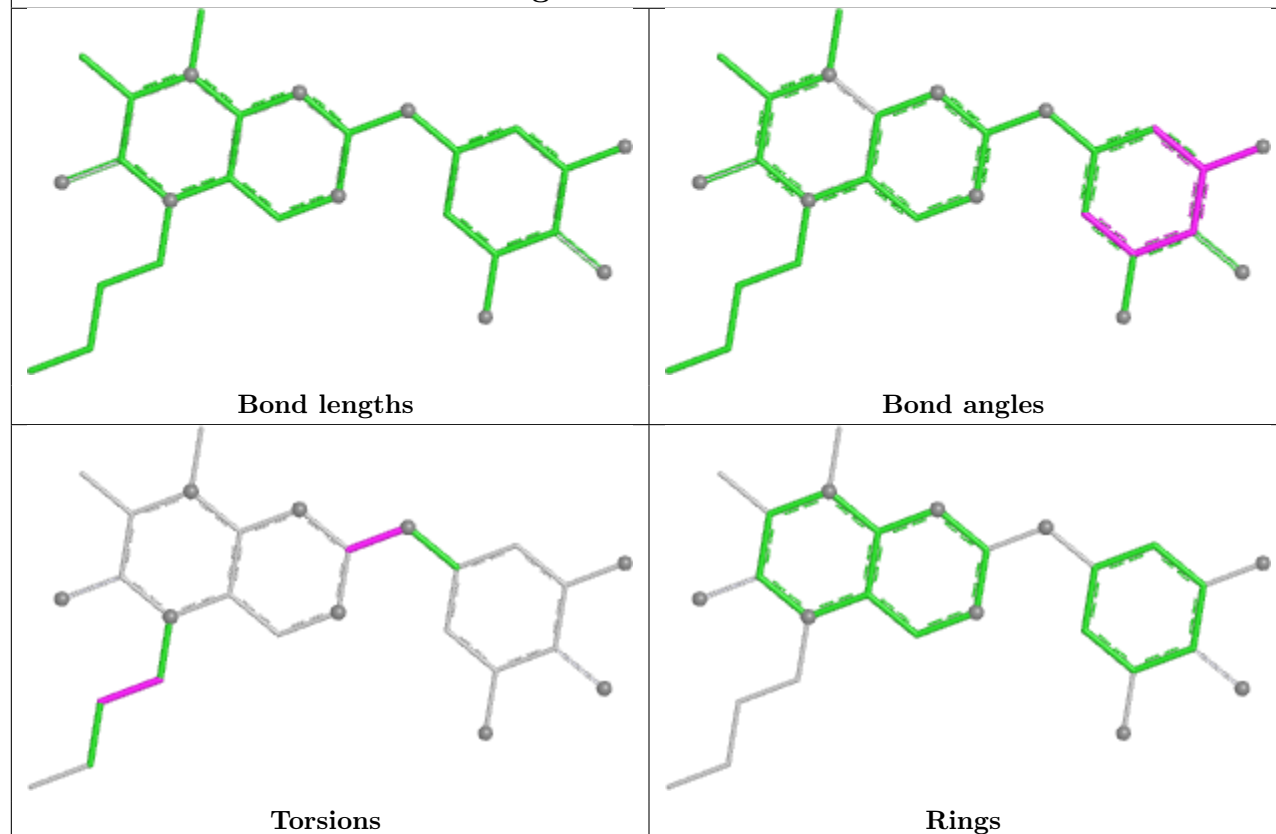
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	D	410	GOL	2	0

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.

Ligand FBY D 401



Ligand FBY B 401



5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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	316/364 (86%)	-0.07	15 (4%)	36	35	16, 31, 54, 76	4 (1%)
1	B	308/364 (84%)	0.29	31 (10%)	12	11	16, 37, 95, 111	3 (0%)
1	C	319/364 (87%)	-0.07	16 (5%)	34	33	16, 31, 58, 82	5 (1%)
1	D	312/364 (85%)	0.13	26 (8%)	17	16	13, 32, 81, 114	4 (1%)
All	All	1255/1456 (86%)	0.07	88 (7%)	22	21	13, 32, 80, 114	16 (1%)

All (88) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	48	PHE	6.8
1	D	122	ASN	5.7
1	B	28	ILE	4.9
1	B	45	GLN	4.7
1	B	49	GLY	4.7
1	D	59	SER	4.5
1	B	75	SER	4.4
1	C	20	ALA	4.3
1	B	125	SER	4.2
1	D	77	ASN	3.9
1	D	294	ASN	3.9
1	D	25	VAL	3.8
1	B	36	ALA	3.8
1	A	20	ALA	3.8
1	A	292	ALA	3.7
1	B	65	ASP	3.7
1	C	45	GLN	3.7
1	B	41	LEU	3.7
1	B	30	THR	3.7
1	D	76	ASP	3.7
1	B	89[A]	ARG	3.7

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Mol	Chain	Res	Type	RSRZ
1	B	62	VAL	3.6
1	B	44	GLY	3.6
1	C	219	ARG	3.5
1	B	121	LYS	3.4
1	A	50	CYS	3.4
1	C	220	CYS	3.4
1	C	48	PHE	3.4
1	B	25	VAL	3.3
1	B	56	MET	3.3
1	D	22	GLN	3.3
1	B	57	ASN	3.2
1	D	125	SER	3.2
1	B	77	ASN	3.1
1	D	57	ASN	3.1
1	B	32	MET	3.1
1	A	293	ALA	3.0
1	B	50	CYS	2.9
1	B	43	ILE	2.9
1	A	58	SER	2.9
1	D	126	TYR	2.9
1	D	121	LYS	2.9
1	D	23	PHE	2.8
1	B	33	ALA	2.8
1	C	222	ASP	2.7
1	B	292	ALA	2.7
1	D	24	ALA	2.7
1	D	56	MET	2.7
1	B	23	PHE	2.7
1	B	76	ASP	2.7
1	A	43	ILE	2.7
1	A	294	ASN	2.6
1	A	221	HIS	2.6
1	D	50	CYS	2.5
1	A	187	TYR	2.5
1	C	215	ALA	2.5
1	C	217	PRO	2.5
1	A	220	CYS	2.5
1	C	123	GLY	2.5
1	B	34	ALA	2.4
1	C	101[A]	ARG	2.4
1	C	21	GLU	2.4
1	B	293	ALA	2.4

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Mol	Chain	Res	Type	RSRZ
1	D	34	ALA	2.4
1	D	120	ASP	2.4
1	A	59	SER	2.3
1	A	263[A]	ASP	2.3
1	B	126	TYR	2.3
1	D	62	VAL	2.3
1	D	41	LEU	2.3
1	A	217	PRO	2.2
1	C	44	GLY	2.2
1	C	187	TYR	2.2
1	A	101	ARG	2.2
1	B	277[A]	ARG	2.2
1	D	28	ILE	2.1
1	C	64	SER	2.1
1	D	32	MET	2.1
1	A	60	GLU	2.1
1	B	118	LEU	2.1
1	D	43	ILE	2.1
1	C	221	HIS	2.1
1	C	253	GLN	2.1
1	D	65	ASP	2.1
1	D	38	LYS	2.0
1	B	52	TYR	2.0
1	B	72	VAL	2.0
1	D	101[A]	ARG	2.0

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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 ⓘ

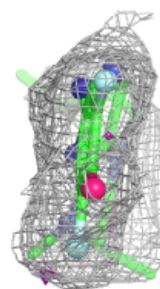
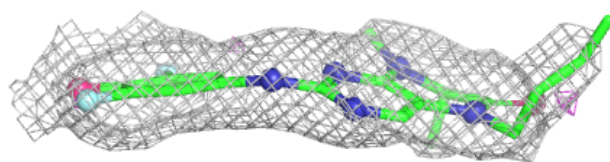
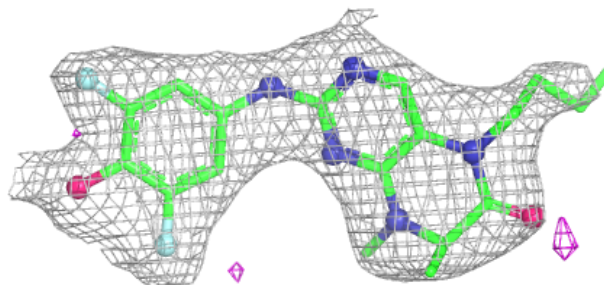
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
6	GOL	D	412	6/6	0.64	0.25	51,56,57,57	0
2	SO4	A	402	5/5	0.67	0.20	91,92,94,97	0
4	PG4	A	405	13/13	0.72	0.25	51,60,62,63	0
6	GOL	C	406	6/6	0.73	0.21	61,63,64,66	0
4	PG4	A	404	13/13	0.73	0.23	62,63,64,65	0
2	SO4	D	405	5/5	0.77	0.12	75,76,78,79	0
2	SO4	D	407	5/5	0.77	0.15	97,98,100,100	0
2	SO4	C	403	5/5	0.78	0.19	89,89,90,93	0
6	GOL	C	405	6/6	0.78	0.21	58,59,62,64	0
3	ACT	D	415	4/4	0.79	0.20	63,64,64,65	0
2	SO4	D	406	5/5	0.79	0.19	82,87,89,90	0
6	GOL	D	413	6/6	0.79	0.18	51,53,54,54	0
2	SO4	C	402	5/5	0.80	0.14	71,74,78,79	0
6	GOL	B	407	6/6	0.80	0.17	45,50,50,51	0
6	GOL	D	409	6/6	0.81	0.17	54,57,57,59	0
2	SO4	B	402	5/5	0.81	0.16	73,73,77,78	0
6	GOL	B	408	6/6	0.81	0.16	66,68,70,74	0
2	SO4	B	403	5/5	0.83	0.11	80,80,81,82	0
6	GOL	C	404	6/6	0.83	0.19	58,58,58,59	0
6	GOL	C	407	6/6	0.83	0.19	55,59,60,60	0
6	GOL	B	406	6/6	0.84	0.17	51,52,54,55	0
6	GOL	D	411	6/6	0.85	0.15	55,58,59,60	0
2	SO4	D	404	5/5	0.86	0.14	61,64,66,67	0
2	SO4	C	401	5/5	0.86	0.20	61,66,67,70	0
6	GOL	D	410	6/6	0.87	0.17	49,51,52,53	0
6	GOL	D	414	6/6	0.87	0.15	48,52,53,53	0
2	SO4	B	404	5/5	0.88	0.20	63,65,68,68	0
6	GOL	D	408	6/6	0.89	0.12	32,33,34,35	0
3	ACT	A	403	4/4	0.91	0.15	48,50,50,50	0
2	SO4	A	401	5/5	0.91	0.16	68,69,73,74	0
7	CL	D	416	1/1	0.92	0.34	68,68,68,68	0
5	FBY	B	401	27/27	0.93	0.10	44,54,62,64	0
5	FBY	D	401	27/27	0.94	0.08	27,35,43,46	0
2	SO4	D	403	5/5	0.94	0.10	49,51,52,54	0
6	GOL	B	405	6/6	0.95	0.09	31,34,34,35	0
7	CL	C	408	1/1	0.95	0.15	46,46,46,46	0
2	SO4	D	402	5/5	0.95	0.12	50,51,53,55	0

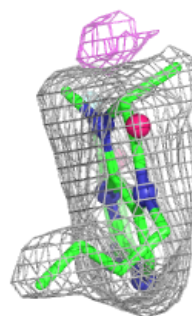
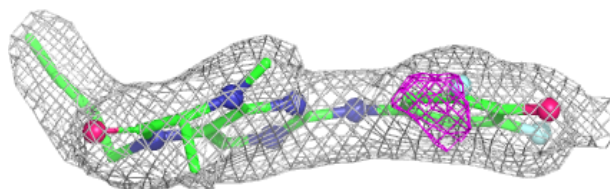
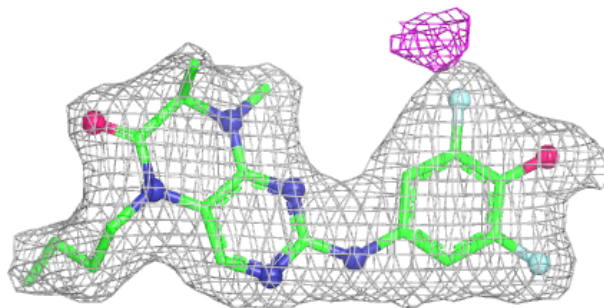
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around FBY B 401:

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

**Electron density around FBY D 401:**

$2mF_o-DF_c$ (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.