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Full wwPDB X-ray Structure Validation Report ⓘ

Sep 26, 2023 – 02:01 PM EDT

PDB ID	:	6CMM
Title	:	Crystal Structure of the Human vaccinia-related kinase bound to a N,N-dipro pynyl-dihydropteridine inhibitor
Authors	:	dos Reis, C.V.; de Souza, G.P.; Counago, R.M.; 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	:	2018-03-05
Resolution	:	2.10 Å(reported)

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

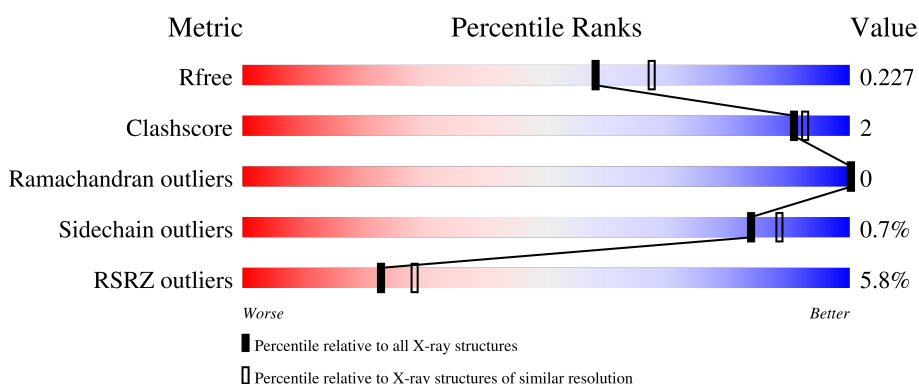|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

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 2.10 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	Percentile Ranks	Value
Rfree		0.227
Clashscore		2
Ramachandran outliers		0
Sidechain outliers		0.7%
RSRZ outliers		5.8%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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 <=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	5% / 83% • 13%
1	B	364	6% / 82% • 15%
1	C	364	4% / 82% 5% 13%
1	D	364	5% / 83% • 13%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	ACT	B	407	-	-	X	-

2 Entry composition ⓘ

There are 6 unique types of molecules in this entry. The entry contains 10579 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	318	Total	C	N	O	S	0	2	0
			2516	1606	429	469	12			
1	B	310	Total	C	N	O	S	0	2	0
			2458	1574	422	451	11			
1	C	316	Total	C	N	O	S	0	2	0
			2512	1603	430	467	12			
1	D	315	Total	C	N	O	S	0	3	0
			2494	1597	428	456	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 ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).

ACT

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

- Molecule 3 is (7R)-2-[(3,5-difluoro-4-hydroxyphenyl)amino]-7-methyl-5,8-di(prop-2-yn-1-yl)-7,8-dihydropteridin-6(5H)-one (three-letter code: F7D) (formula: $C_{19}H_{15}F_2N_5O_2$).
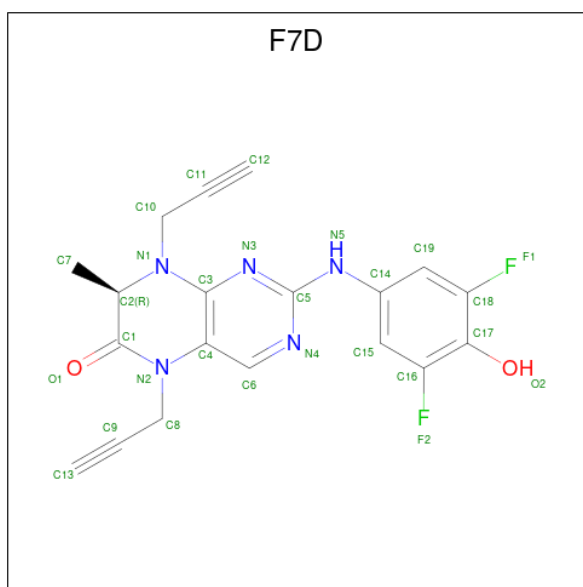
F7D

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	B	1	Total	C	F	N	O	0	0
			28	19	2	5	2		
3	D	1	Total	C	F	N	O	0	0
			28	19	2	5	2		

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O_4S).
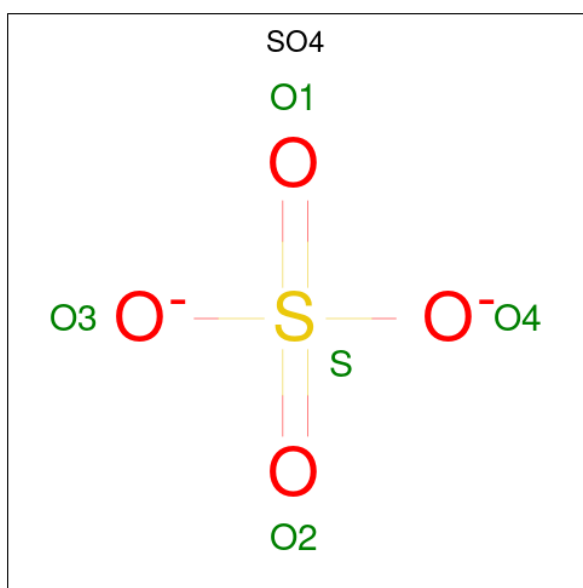
SO4

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

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

- Molecule 5 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: $C_4H_{10}O_3$).
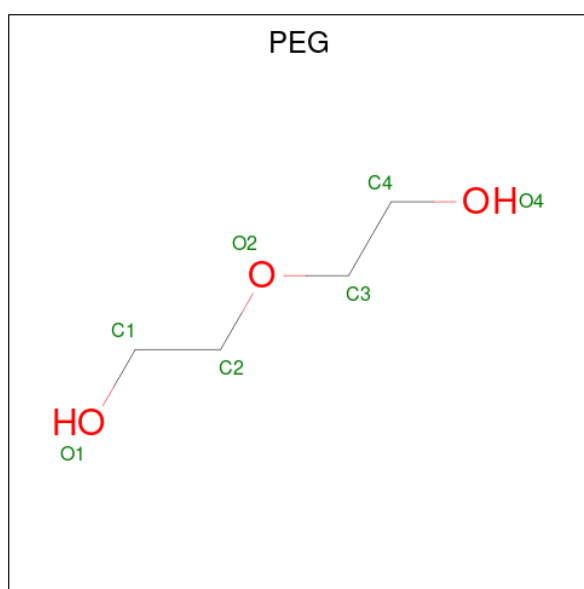
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total C O 7 4 3			0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	113	Total O 113 113		0	0
6	B	101	Total O 101 101		0	0
6	C	132	Total O 132 132		0	0
6	D	128	Total O 128 128		0	0

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: Serine/threonine-protein kinase VRK1
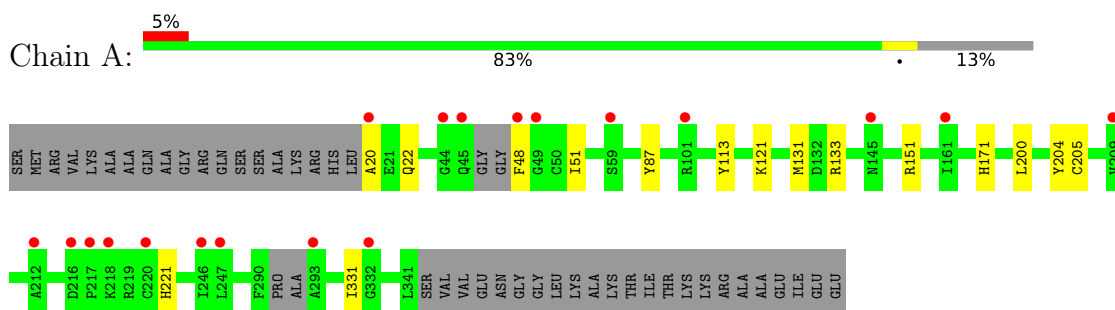
- Molecule 1: Serine/threonine-protein kinase VRK1
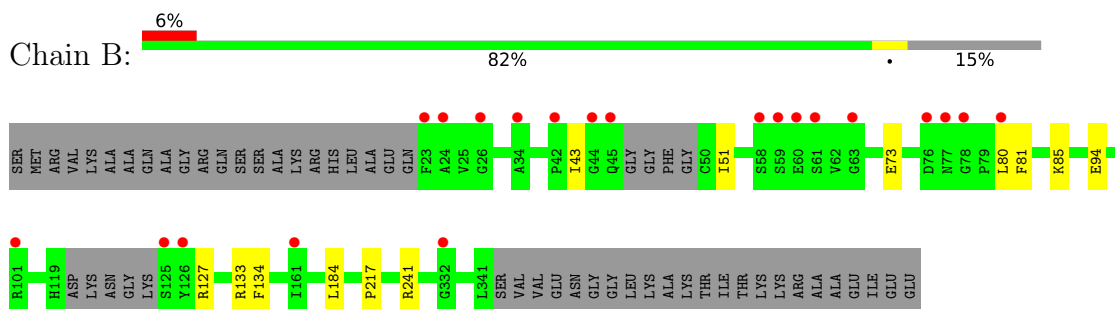
- Molecule 1: Serine/threonine-protein kinase VRK1

- Molecule 1: Serine/threonine-protein kinase VRK1
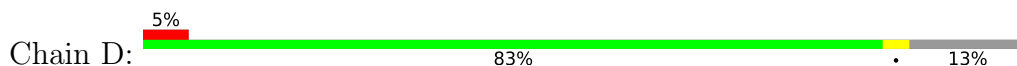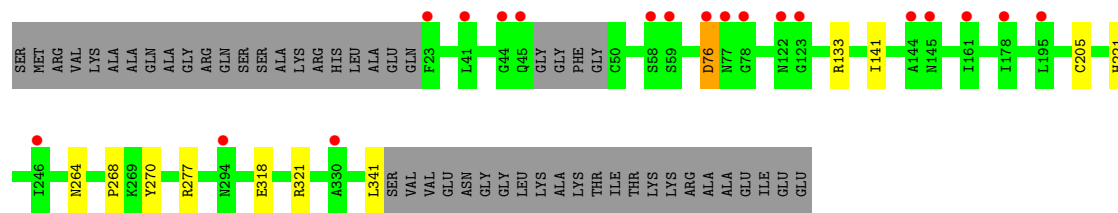
4   Data and refinement statistics   ⓘ

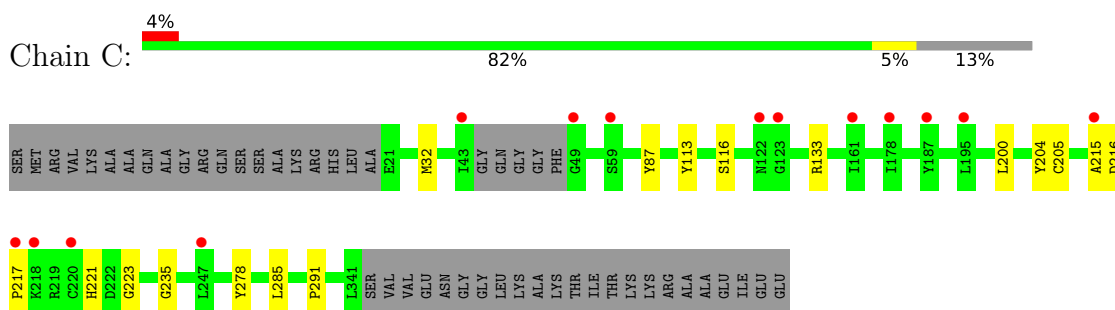| Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	92.06Å 95.75Å 192.83Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.79 – 2.10 29.79 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.9 (29.79-2.10) 99.9 (29.79-2.10)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.81 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.8.0189	Depositor
R, R_{free}	0.190 , 0.222 0.201 , 0.227	Depositor DCC
R_{free} test set	5052 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å^2)	30.9	Xtriage
Anisotropy	0.851	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 46.2	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.019 for k,h,-l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	10579	wwPDB-VP
Average B, all atoms (Å^2)	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.23% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: F7D, PEG, ACT, 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	0.63	0/2579	0.76	0/3493
1	B	0.56	0/2519	0.71	0/3413
1	C	0.60	0/2574	0.71	0/3490
1	D	0.63	0/2556	0.74	0/3467
All	All	0.61	0/10228	0.73	0/13863

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	2516	0	2438	10	0
1	B	2458	0	2379	7	0
1	C	2512	0	2433	8	0
1	D	2494	0	2406	8	0
2	A	8	0	6	1	0
2	B	12	0	9	2	0
2	C	8	0	6	0	0
2	D	4	0	3	0	0
3	B	28	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	D	28	0	0	0	0
4	B	10	0	0	0	0
4	C	5	0	0	0	0
4	D	15	0	0	0	0
5	B	7	0	10	0	0
6	A	113	0	0	0	0
6	B	101	0	0	0	0
6	C	132	0	0	0	0
6	D	128	0	0	0	0
All	All	10579	0	9690	34	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 2.

All (34) 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:134:PHE:HB2	1:B:184:LEU:HD23	1.74	0.69
1:B:80:LEU:HD23	1:B:127:ARG:HB3	1.75	0.69
2:B:405:ACT:OXT	2:B:407:ACT:H3	2.01	0.61
1:C:200:LEU:HD13	1:C:221:HIS:CG	2.37	0.59
1:B:241:ARG:HH22	2:B:407:ACT:H2	1.66	0.59
1:A:20:ALA:O	1:A:22:GLN:NE2	2.38	0.57
1:A:200:LEU:HD13	1:A:221:HIS:CG	2.40	0.56
1:A:205:CYS:SG	1:A:205:CYS:O	2.64	0.55
1:D:141:ILE:HD13	1:D:341:LEU:HD13	1.90	0.54
1:B:81:PHE:CE2	1:B:85:LYS:HD2	2.46	0.50
1:C:215:ALA:HB2	1:C:235:GLY:O	2.10	0.50
1:D:341:LEU:HD12	1:D:341:LEU:C	2.32	0.50
1:A:171:HIS:NE2	2:A:401:ACT:H3	2.27	0.50
1:C:32:MET:HG3	1:C:116:SER:O	2.12	0.50
1:D:318:GLU:OE2	1:D:321:ARG:NH1	2.46	0.49
1:A:48:PHE:CB	1:A:51:ILE:HD12	2.44	0.48
1:B:94:GLU:H	1:B:94:GLU:CD	2.17	0.47
1:D:221:HIS:CE1	1:D:268:PRO:HB2	2.50	0.47
1:A:87:TYR:HB3	1:A:113:TYR:HB2	1.97	0.46
1:A:151:ARG:HD3	1:A:331:ILE:HG21	1.97	0.46
1:D:264:ASN:HB3	1:D:270:TYR:CD2	2.51	0.46
1:C:221:HIS:CD2	1:C:223:GLY:H	2.34	0.45
1:C:216:ASP:HA	1:C:217:PRO:HD2	1.88	0.44
1:A:22:GLN:O	1:A:121:LYS:HD2	2.19	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:76:ASP:OD1	1:D:76:ASP:N	2.46	0.43
1:B:43:ILE:HD12	1:B:51:ILE:HG22	2.01	0.42
1:C:278:TYR:CG	1:C:285:LEU:HD13	2.54	0.42
1:A:87:TYR:CE1	1:A:131:MET:HE1	2.55	0.42
1:D:205:CYS:SG	1:D:205:CYS:O	2.76	0.42
1:C:87:TYR:HB3	1:C:113:TYR:HB2	2.02	0.41
1:A:204:TYR:CE2	1:A:205:CYS:HB2	2.55	0.41
1:B:73:GLU:HB2	1:B:80:LEU:HD22	2.03	0.40
1:D:277[B]:ARG:HH21	1:D:277[B]:ARG:HD2	1.71	0.40
1:C:204:TYR:CE2	1:C:205:CYS:HB2	2.57	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	314/364 (86%)	309 (98%)	5 (2%)	0	100	100
1	B	306/364 (84%)	295 (96%)	11 (4%)	0	100	100
1	C	314/364 (86%)	302 (96%)	12 (4%)	0	100	100
1	D	314/364 (86%)	304 (97%)	10 (3%)	0	100	100
All	All	1248/1456 (86%)	1210 (97%)	38 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	260/304 (86%)	259 (100%)	1 (0%)	91	94
1	B	250/304 (82%)	248 (99%)	2 (1%)	81	86
1	C	260/304 (86%)	258 (99%)	2 (1%)	81	86
1	D	252/304 (83%)	250 (99%)	2 (1%)	81	86
All	All	1022/1216 (84%)	1015 (99%)	7 (1%)	84	88

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

Mol	Chain	Res	Type
1	A	133	ARG
1	B	133	ARG
1	B	217	PRO
1	C	133	ARG
1	C	291	PRO
1	D	76	ASP
1	D	133	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	221	HIS
1	D	145	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

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5.6 Ligand geometry ⓘ

17 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	$\#|Z| > 2$
5	PEG	B	404	-	6,6,6	0.45	0	5,5,5	0.31	0
4	SO4	C	401	-	4,4,4	0.26	0	6,6,6	0.47	0
2	ACT	B	407	-	3,3,3	0.87	0	3,3,3	0.52	0
4	SO4	D	404	-	4,4,4	0.41	0	6,6,6	0.25	0
4	SO4	D	402	-	4,4,4	0.37	0	6,6,6	0.29	0
3	F7D	B	401	-	29,30,30	0.59	1 (3%)	32,43,43	1.26	5 (15%)
2	ACT	C	402	-	3,3,3	0.82	0	3,3,3	0.60	0
3	F7D	D	401	-	29,30,30	0.68	0	32,43,43	1.19	4 (12%)
2	ACT	A	402	-	3,3,3	0.78	0	3,3,3	0.79	0
2	ACT	A	401	-	3,3,3	0.81	0	3,3,3	0.64	0
2	ACT	B	405	-	3,3,3	0.78	0	3,3,3	1.34	0
4	SO4	B	403	-	4,4,4	0.36	0	6,6,6	0.06	0
2	ACT	D	405	-	3,3,3	0.78	0	3,3,3	0.72	0
2	ACT	B	406	-	3,3,3	0.81	0	3,3,3	0.70	0
4	SO4	D	403	-	4,4,4	0.29	0	6,6,6	0.40	0
2	ACT	C	403	-	3,3,3	0.71	0	3,3,3	0.89	0
4	SO4	B	402	-	4,4,4	0.28	0	6,6,6	0.37	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
5	PEG	B	404	-	-	2/4/4/4	-
3	F7D	B	401	-	-	1/8/30/30	0/3/3/3
3	F7D	D	401	-	-	2/8/30/30	0/3/3/3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	401	F7D	C6-C4	2.03	1.42	1.39

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	401	F7D	F1-C18-C17	2.78	119.19	117.13
3	B	401	F7D	F1-C18-C17	2.69	119.12	117.13
3	D	401	F7D	C15-C16-C17	-2.63	121.73	123.79
3	B	401	F7D	C15-C16-C17	-2.53	121.81	123.79
3	B	401	F7D	C19-C18-C17	-2.50	121.83	123.79
3	D	401	F7D	C19-C18-C17	-2.49	121.84	123.79
3	B	401	F7D	F2-C16-C17	2.37	118.89	117.13
3	D	401	F7D	F2-C16-C17	2.08	118.68	117.13
3	B	401	F7D	C7-C2-N1	-2.05	109.95	112.34

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	B	404	PEG	O2-C3-C4-O4
5	B	404	PEG	O1-C1-C2-O2
3	D	401	F7D	N3-C5-N5-C14
3	D	401	F7D	N4-C5-N5-C14
3	B	401	F7D	N3-C5-N5-C14

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	407	ACT	2	0
2	A	401	ACT	1	0
2	B	405	ACT	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 then 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 F7D B 401

Bond lengths

Bond angles

Torsions

Rings

Ligand F7D D 401

Bond lengths

Bond angles

Torsions

Rings
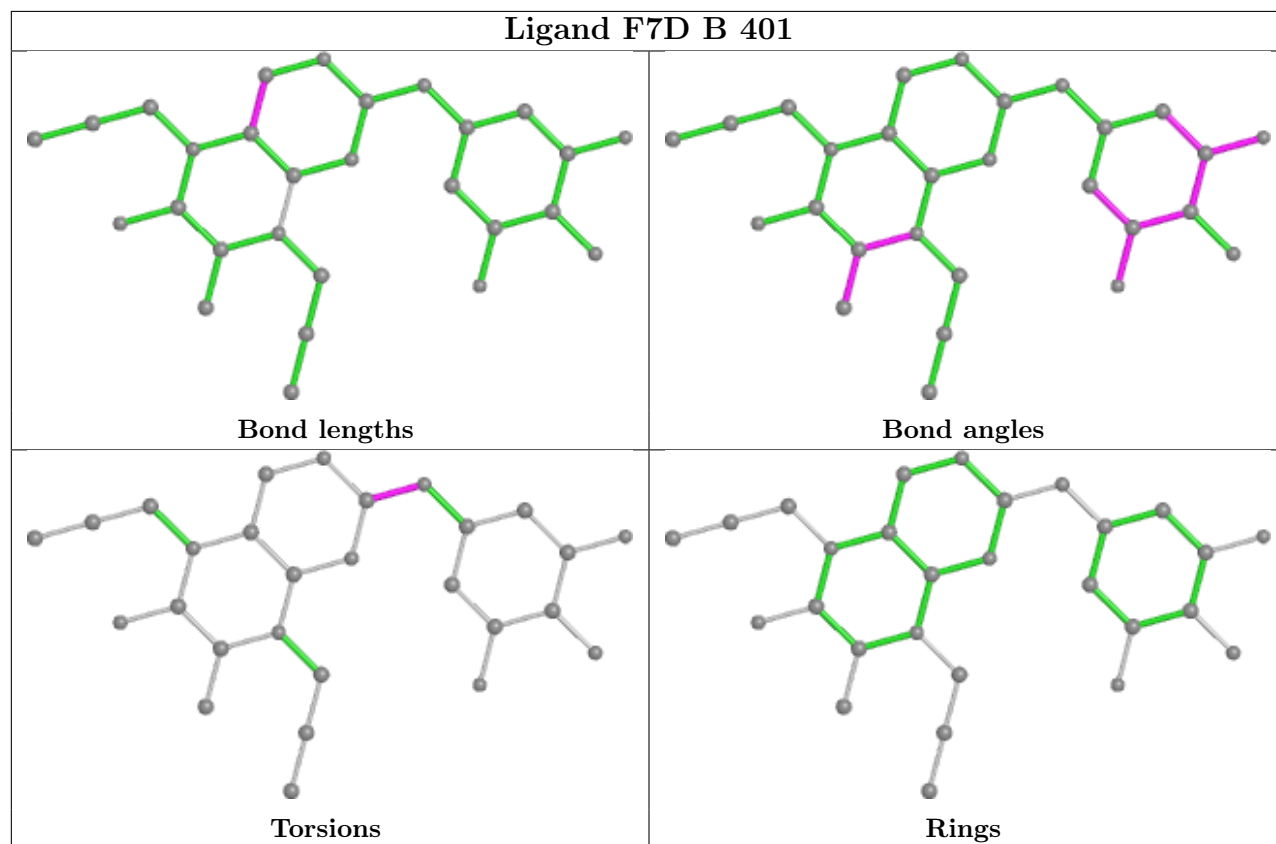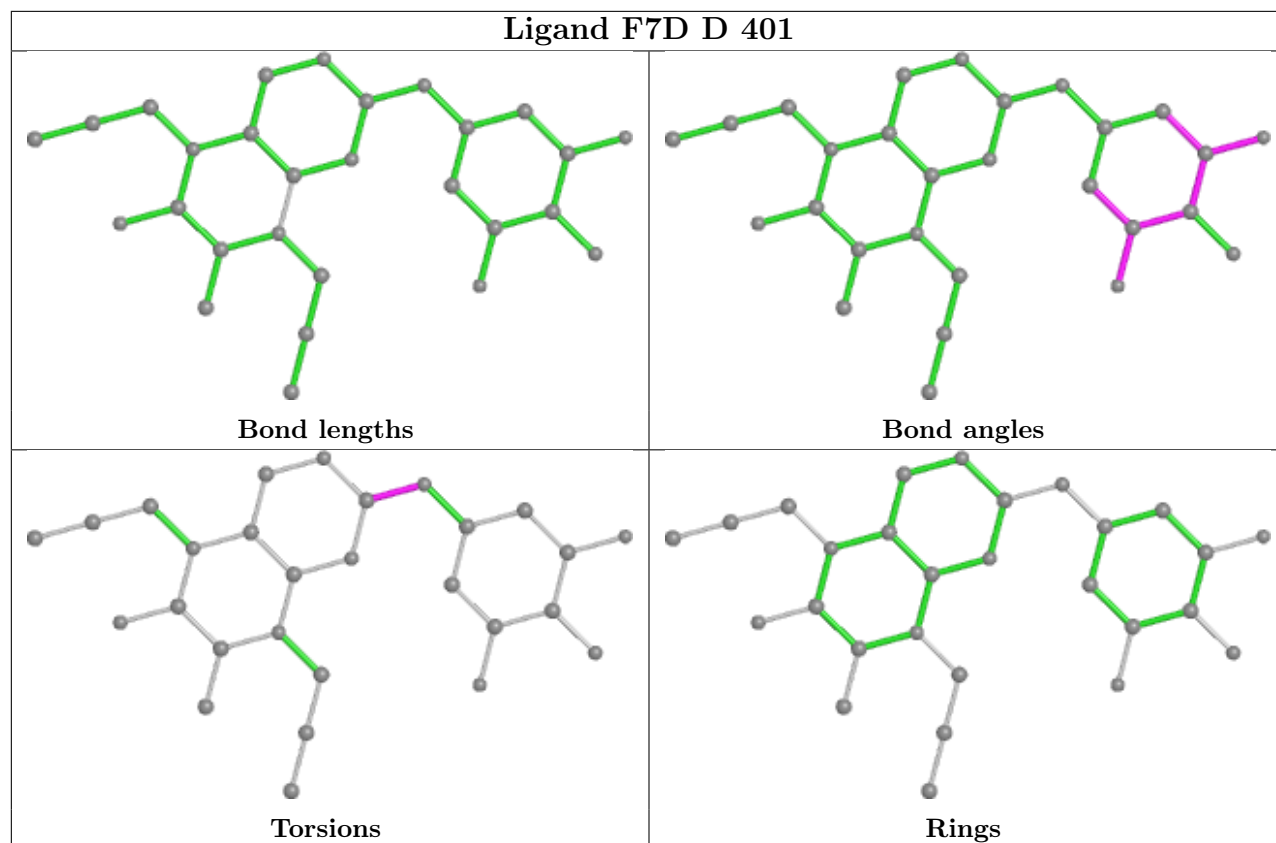
5.7 Other polymers ⓘ

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(Å²)	Q<0.9
1	A	318/364 (87%)	0.06	19 (5%)	21	27	26, 37, 63, 81	0
1	B	310/364 (85%)	0.19	21 (6%)	17	21	25, 40, 71, 92	0
1	C	316/364 (86%)	0.04	14 (4%)	34	40	23, 39, 63, 77	0
1	D	315/364 (86%)	0.11	19 (6%)	21	27	22, 37, 70, 88	0
All	All	1259/1456 (86%)	0.10	73 (5%)	23	28	22, 38, 68, 92	0

All (73) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	59	SER	6.8
1	D	76	ASP	5.6
1	C	220	CYS	5.5
1	C	217	PRO	5.4
1	B	44	GLY	5.4
1	A	59	SER	4.4
1	A	217	PRO	4.3
1	D	59	SER	4.2
1	B	76	ASP	4.2
1	B	80	LEU	4.2
1	C	49	GLY	3.9
1	C	187	TYR	3.6
1	B	77	ASN	3.5
1	A	20	ALA	3.5
1	B	60	GLU	3.5
1	C	215	ALA	3.5
1	A	49	GLY	3.5
1	A	44	GLY	3.4
1	C	59	SER	3.4
1	B	24	ALA	3.4
1	B	42	PRO	3.3

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Mol	Chain	Res	Type	RSRZ
1	D	161	ILE	3.3
1	D	58	SER	3.2
1	B	58	SER	3.2
1	B	126	TYR	3.2
1	A	45	GLN	3.1
1	D	44	GLY	3.1
1	D	330	ALA	3.1
1	D	77	ASN	3.1
1	D	123	GLY	3.0
1	D	122	ASN	3.0
1	B	34	ALA	2.9
1	A	293	ALA	2.8
1	C	122	ASN	2.8
1	C	247	LEU	2.8
1	B	45	GLN	2.8
1	A	48	PHE	2.7
1	D	23	PHE	2.7
1	D	144	ALA	2.7
1	D	145	ASN	2.7
1	D	294	ASN	2.6
1	B	332	GLY	2.6
1	A	101	ARG	2.6
1	D	195	LEU	2.6
1	D	45	GLN	2.5
1	A	332	GLY	2.5
1	A	220	CYS	2.5
1	C	123	GLY	2.4
1	B	63	GLY	2.4
1	A	161	ILE	2.4
1	B	23	PHE	2.4
1	D	41	LEU	2.4
1	B	161	ILE	2.4
1	A	209	VAL	2.3
1	C	178	ILE	2.3
1	A	212	ALA	2.3
1	C	218	LYS	2.3
1	A	216	ASP	2.3
1	D	178	ILE	2.3
1	A	247	LEU	2.2
1	B	125	SER	2.2
1	B	101	ARG	2.2
1	C	161	ILE	2.2

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Mol	Chain	Res	Type	RSRZ
1	D	78	GLY	2.2
1	B	61	SER	2.1
1	A	218	LYS	2.1
1	C	43	ILE	2.1
1	D	246	ILE	2.1
1	B	26	GLY	2.1
1	B	78	GLY	2.1
1	C	195	LEU	2.1
1	A	145	ASN	2.0
1	A	246	ILE	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 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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.
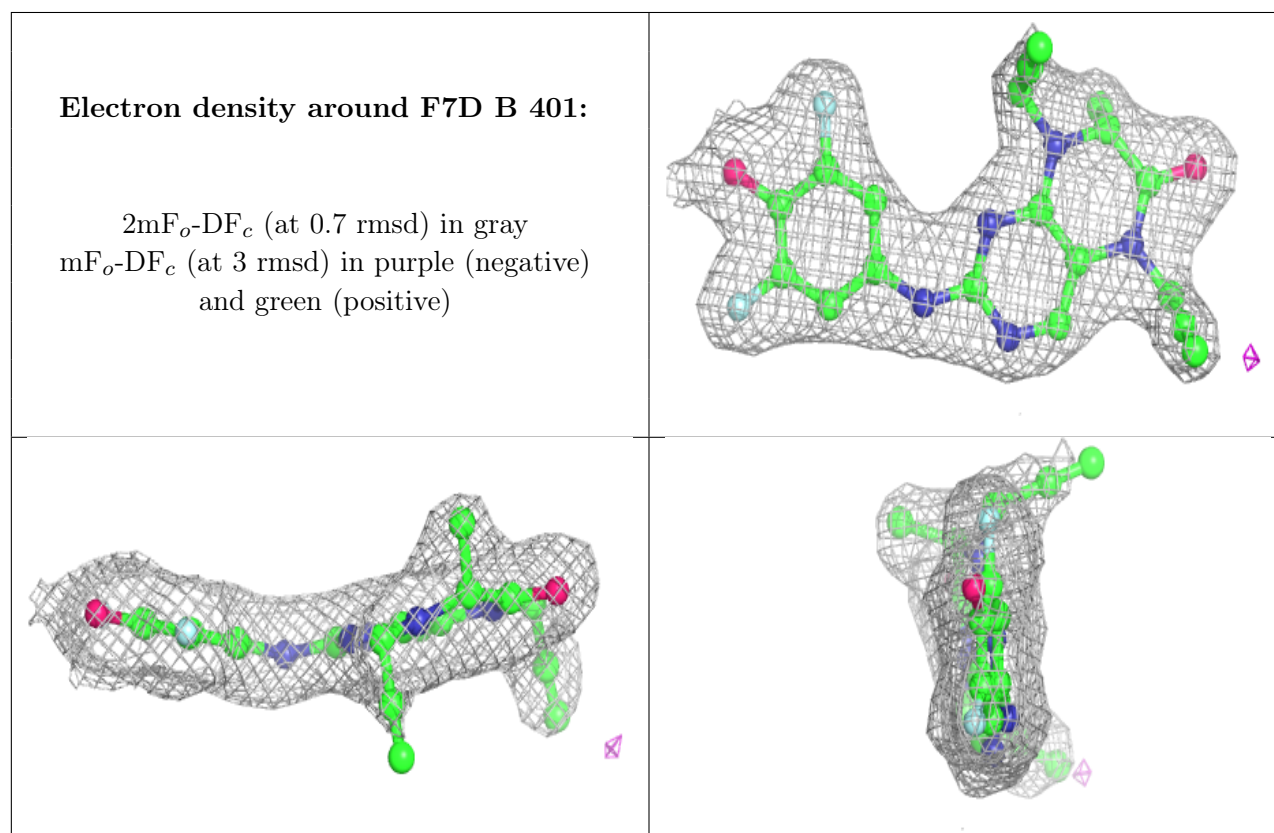
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($Å^2$)	Q<0.9
2	ACT	B	405	4/4	0.25	0.27	54,56,57,61	0
2	ACT	A	401	4/4	0.74	0.20	59,60,61,63	0
5	PEG	B	404	7/7	0.75	0.18	49,60,64,65	0
4	SO4	D	404	5/5	0.78	0.23	66,69,78,78	0
3	F7D	B	401	28/28	0.89	0.14	34,45,50,60	0
3	F7D	D	401	28/28	0.92	0.11	32,39,44,50	0
2	ACT	C	403	4/4	0.92	0.18	45,48,49,50	0
2	ACT	B	407	4/4	0.92	0.20	52,54,54,62	0
4	SO4	D	403	5/5	0.93	0.12	63,65,68,68	0
2	ACT	A	402	4/4	0.93	0.12	54,55,55,56	0
2	ACT	D	405	4/4	0.93	0.08	57,58,59,62	0
2	ACT	C	402	4/4	0.95	0.09	53,54,55,57	0
4	SO4	B	402	5/5	0.96	0.17	54,55,60,65	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($Å^2$)	Q<0.9
2	ACT	B	406	4/4	0.96	0.09	58,59,60,60	0
4	SO4	B	403	5/5	0.97	0.22	78,79,79,81	0
4	SO4	C	401	5/5	0.97	0.12	50,51,56,57	0
4	SO4	D	402	5/5	0.97	0.13	48,49,51,55	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 F7D B 401:

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

Electron density around F7D 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 ⓘ

There are no such residues in this entry.