Full wwPDB X-ray Structure Validation Report (i)

Jun 12, 2024 – 06:53 PM EDT

PDB ID	:	3QFV
Title	:	MRCK beta in complex with TPCA-1
Authors	:	Heikkila, T.J.; Wheatley, E.; Crighton, D.; Schroder, E.; Boakes, A.; Kaye, S.J.; Mezna, M.; Pang, L.; Rushbrooke, M.; Turnbull, A.; Olson, M.F.
Deposited on	:	2011-01-23
Resolution	:	2.65 Å(reported)

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

|		
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.36.2
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)	:	2.36.2

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 2.65 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.
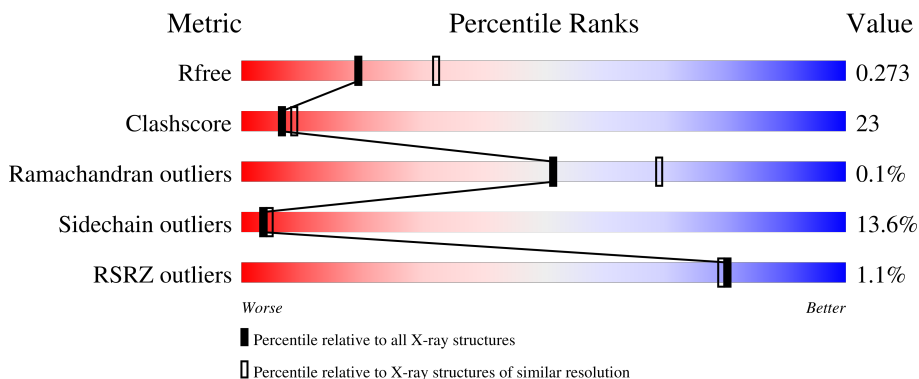
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1332 (2.68-2.64)
Clashscore	141614	1374 (2.68-2.64)
Ramachandran outliers	138981	1349 (2.68-2.64)
Sidechain outliers	138945	1349 (2.68-2.64)
RSRZ outliers	127900	1318 (2.68-2.64)

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	415	62% 27% 6% 5%
1	B	415	2% / 56% 33% 7% 5%

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	NM7	A	416	-	-	X	-

2 Entry composition ⓘ

There are 6 unique types of molecules in this entry. The entry contains 6395 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 CDC42BPB protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	395	Total	C	N	O	S	0	0	0
			3110	1998	511	581	20			
1	B	396	Total	C	N	O	S	0	0	0
			3116	2006	508	582	20			

- Molecule 2 is 2-(carbamoylamino)-5-(4-fluorophenyl)thiophene-3-carboxamide (three-letter code: NM7) (formula: $C_{12}H_{10}FN_3O_2S$).
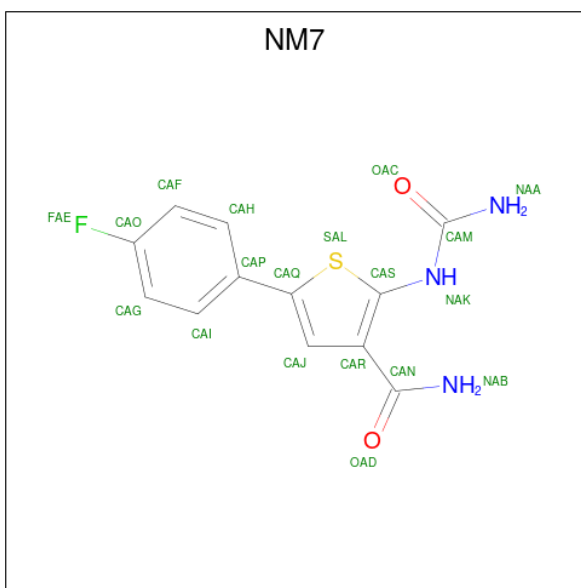
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	S	0	0
			19	12	1	3	2	1		
2	B	1	Total	C	F	N	O	S	0	0
			19	12	1	3	2	1		

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).

EDO

O2

OH

C1

C2

HO

O1

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

- Molecule 4 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	2	Total 2	Cl 2	0	0

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	B	1	Total 1	Mg 1	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	53	Total 53	O 53	0	0
6	B	63	Total 63	O 63	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: CDC42BPB protein
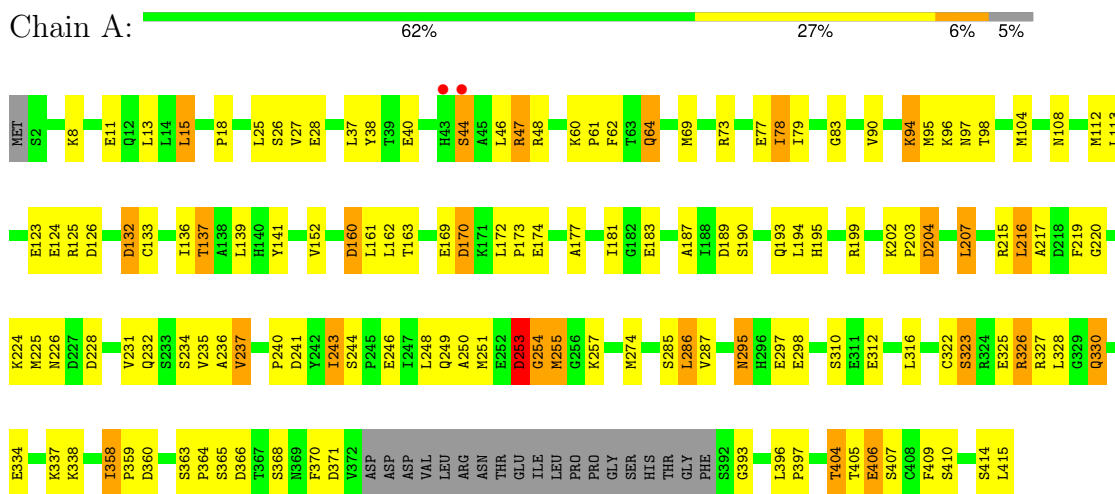
- Molecule 1: CDC42BPB protein
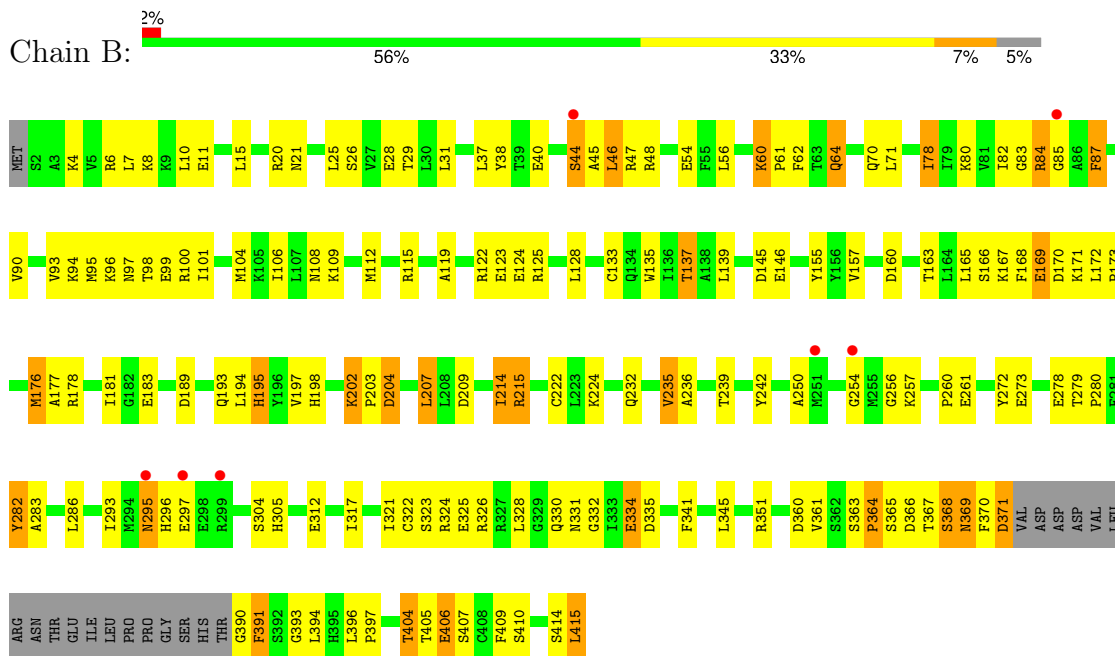
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	44.81Å　　123.36Å　　85.49Å 90.00°　　100.69°　　90.00°	Depositor
Resolution (Å)	39.97　–　2.65 40.07　–　2.65	Depositor EDS
% Data completeness (in resolution range)	94.3 (39.97-2.65) 93.9 (40.07-2.65)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.29 (at 2.65Å)	Xtriage
Refinement program	REFMAC 5.5.0102	Depositor
R, R_{free}	0.192　,　0.268 0.205　,　0.273	Depositor DCC
R_{free} test set	1254 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å^2)	46.3	Xtriage
Anisotropy	0.134	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 54.6	EDS
L-test for twinning[2]	$< |L| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	6395	wwPDB-VP
Average B, all atoms (Å^2)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.42% 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 ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: MG, EDO, NM7, CL

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	1.49	2/3182 (0.1%)	0.87	2/4315 (0.0%)
1	B	1.52	4/3189 (0.1%)	0.93	4/4323 (0.1%)
All	All	1.51	6/6371 (0.1%)	0.90	6/8638 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	B	0	2
All	All	0	4

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	123	GLU	CD-OE1	-5.30	1.19	1.25
1	A	123	GLU	CD-OE1	-5.24	1.19	1.25
1	B	155	TYR	CE1-CZ	-5.20	1.31	1.38
1	B	273	GLU	CD-OE1	-5.12	1.20	1.25
1	A	183	GLU	CD-OE1	-5.07	1.20	1.25
1	B	135	TRP	NE1-CE2	-5.07	1.30	1.37

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	390	GLY	N-CA-C	-15.91	73.33	113.10
1	B	78	ILE	CB-CA-C	-6.23	99.14	111.60
1	B	391	PHE	N-CA-CB	5.95	121.31	110.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	78	ILE	CB-CA-C	-5.75	100.11	111.60
1	A	126	ASP	CB-CG-OD1	5.56	123.31	118.30
1	B	85	GLY	N-CA-C	-5.07	100.43	113.10

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	253	ASP	Peptide
1	A	254	GLY	Peptide
1	B	115	ARG	Peptide
1	B	254	GLY	Peptide

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	3110	0	2950	140	0
1	B	3116	0	2956	155	1
2	A	19	0	10	10	0
2	B	19	0	10	1	0
3	A	4	0	6	1	0
3	B	8	0	12	1	0
4	B	2	0	0	1	0
5	B	1	0	0	0	0
6	A	53	0	0	4	0
6	B	63	0	0	5	0
All	All	6395	0	5944	287	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 23.

All (287) 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:95:MET:O	1:B:98:THR:HB	1.39	1.23

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:250:ALA:O	1:A:254:GLY:CA	1.90	1.18
1:A:363:SER:CB	1:A:364:PRO:CD	2.23	1.16
1:B:98:THR:CG2	1:B:100:ARG:H	1.58	1.16
1:A:250:ALA:O	1:A:254:GLY:HA3	1.47	1.15
1:A:363:SER:OG	1:A:364:PRO:HD2	1.47	1.13
1:A:363:SER:CB	1:A:364:PRO:HD3	1.80	1.10
1:B:80:LYS:HD3	1:B:367:THR:HG21	1.24	1.09
1:A:40:GLU:OE2	1:A:393:GLY:HA2	1.53	1.08
1:A:363:SER:HB2	1:A:364:PRO:HD3	1.12	1.08
1:B:169:GLU:OE2	1:B:169:GLU:HA	1.49	1.07
1:A:78:ILE:HG22	1:A:78:ILE:O	1.55	1.06
1:A:295:ASN:ND2	1:A:298:GLU:CB	2.20	1.05
1:B:98:THR:HG22	1:B:100:ARG:H	1.21	1.04
1:A:163:THR:HG22	1:A:163:THR:O	1.54	1.03
1:A:295:ASN:HD21	1:A:298:GLU:CB	1.72	1.03
1:A:250:ALA:O	1:A:254:GLY:HA2	1.60	0.99
1:A:370:PHE:CZ	2:A:416:NM7:NAB	2.31	0.98
1:A:195:HIS:O	1:A:225:MET:HG3	1.62	0.98
1:A:363:SER:HB2	1:A:364:PRO:CD	1.88	0.97
1:A:174:GLU:OE2	1:A:310:SER:OG	1.81	0.97
1:B:235:VAL:CG1	1:B:236:ALA:N	2.27	0.96
1:A:195:HIS:HA	1:A:225:MET:HE3	1.49	0.95
1:B:177:ALA:O	1:B:181:ILE:HG12	1.69	0.92
1:B:60:LYS:HB3	1:B:61:PRO:HD3	1.50	0.91
1:A:363:SER:OG	1:A:364:PRO:CD	2.19	0.89
1:A:169:GLU:HB2	6:A:456:HOH:O	1.73	0.88
1:B:334:GLU:OE2	1:B:334:GLU:HA	1.72	0.87
1:A:199:ARG:NH1	1:A:237:VAL:HG21	1.89	0.86
1:B:235:VAL:HG13	1:B:236:ALA:N	1.90	0.86
1:B:215:ARG:NH1	6:B:470:HOH:O	2.09	0.86
1:B:391:PHE:O	1:B:391:PHE:CD1	2.29	0.85
1:B:235:VAL:HG13	1:B:236:ALA:H	1.41	0.85
1:A:28:GLU:OE2	1:A:404:THR:HG23	1.75	0.85
1:A:44:SER:HB3	1:A:46:LEU:HG	1.59	0.84
1:B:209:ASP:OD2	6:B:470:HOH:O	1.94	0.84
1:A:194:LEU:O	1:A:195:HIS:HB2	1.78	0.83
1:A:28:GLU:OE2	1:A:404:THR:CG2	2.27	0.83
1:B:282:TYR:C	1:B:282:TYR:CD2	2.51	0.82
1:B:44:SER:HB2	1:B:391:PHE:H	1.45	0.82
1:A:161:LEU:HD21	1:A:274:MET:CE	2.10	0.81
1:A:235:VAL:HG13	1:A:236:ALA:N	1.94	0.81

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:416:NM7:SAL	2:A:416:NM7:OAC	2.36	0.80
1:B:98:THR:HG22	1:B:100:ARG:N	1.94	0.80
1:A:73:ARG:O	1:A:73:ARG:HG2	1.81	0.80
1:B:44:SER:OG	1:B:46:LEU:HD22	1.82	0.80
1:B:124:GLU:OE1	3:B:421:EDO:H21	1.81	0.80
1:B:334:GLU:OE2	1:B:334:GLU:CA	2.30	0.79
1:A:323:SER:HB3	1:A:325:GLU:OE2	1.82	0.79
1:A:60:LYS:HB3	1:A:61:PRO:HD3	1.64	0.79
1:A:240:PRO:HA	1:A:243:ILE:HG13	1.62	0.79
1:B:96:LYS:O	1:B:97:ASN:HB2	1.83	0.79
1:B:169:GLU:OE2	1:B:169:GLU:CA	2.29	0.79
1:A:370:PHE:HZ	2:A:416:NM7:NAB	1.80	0.77
1:A:226:ASN:HB3	1:A:228:ASP:H	1.48	0.77
1:B:44:SER:O	1:B:45:ALA:HB3	1.83	0.77
1:A:161:LEU:HD21	1:A:274:MET:HE1	1.64	0.77
1:A:249:GLN:O	1:A:253:ASP:OD1	2.04	0.76
1:A:11:GLU:OE1	1:B:407:SER:HA	1.86	0.76
1:B:98:THR:CG2	1:B:100:ARG:N	2.44	0.76
1:A:325:GLU:H	1:A:325:GLU:CD	1.87	0.76
1:B:178:ARG:NH1	1:B:341:PHE:O	2.19	0.75
1:B:60:LYS:CB	1:B:61:PRO:HD3	2.17	0.75
1:B:40:GLU:OE2	1:B:393:GLY:HA2	1.87	0.74
1:B:46:LEU:O	1:B:48:ARG:N	2.20	0.74
1:B:235:VAL:HG12	1:B:236:ALA:N	2.03	0.73
1:B:367:THR:O	1:B:367:THR:HG22	1.87	0.73
1:A:364:PRO:HD2	1:A:365:SER:H	1.53	0.73
1:B:157:VAL:O	1:B:369:ASN:ND2	2.22	0.72
1:A:334:GLU:OE2	1:A:337:LYS:HD2	1.89	0.72
1:B:46:LEU:C	1:B:48:ARG:N	2.42	0.72
1:B:109:LYS:HE3	1:B:145:ASP:O	1.88	0.72
1:A:136:ILE:O	1:A:215:ARG:NH1	2.22	0.72
1:B:391:PHE:O	1:B:391:PHE:HD1	1.71	0.72
1:B:98:THR:HG21	1:B:100:ARG:HB2	1.73	0.71
1:B:371:ASP:CG	1:B:371:ASP:O	2.29	0.70
1:A:338:LYS:O	1:A:338:LYS:HG2	1.90	0.70
1:A:160:ASP:OD1	1:A:160:ASP:C	2.30	0.70
1:A:396:LEU:N	1:A:397:PRO:CD	2.54	0.70
1:B:98:THR:HG23	1:B:100:ARG:HG3	1.74	0.70
4:B:418:CL:CL	6:B:483:HOH:O	2.46	0.70
1:B:70:GLN:OE1	6:B:459:HOH:O	2.09	0.69
1:A:363:SER:CB	1:A:364:PRO:HD2	2.07	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:235:VAL:CG1	1:A:236:ALA:N	2.54	0.69
1:B:90:VAL:HG21	2:B:416:NM7:HAI	1.74	0.69
1:A:415:LEU:O	6:A:447:HOH:O	2.11	0.69
1:B:202:LYS:HE3	1:B:239:THR:OG1	1.93	0.69
1:B:46:LEU:C	1:B:48:ARG:H	1.95	0.69
1:A:104:MET:HE2	1:A:152:VAL:HG22	1.76	0.68
1:B:98:THR:HG23	1:B:100:ARG:H	1.55	0.68
1:A:132:ASP:C	1:A:132:ASP:OD1	2.29	0.68
1:A:90:VAL:HG11	2:A:416:NM7:HAI	1.77	0.67
1:B:98:THR:CG2	1:B:99:GLU:N	2.58	0.67
1:B:168:PHE:O	1:B:169:GLU:HB2	1.95	0.67
1:B:363:SER:O	1:B:366:ASP:HB2	1.94	0.67
1:A:195:HIS:C	1:A:225:MET:HE2	2.16	0.66
1:A:236:ALA:HB2	1:A:251:MET:SD	2.36	0.65
1:A:95:MET:HB3	1:A:98:THR:OG1	1.97	0.65
1:B:360:ASP:O	1:B:361:VAL:HG12	1.97	0.65
1:A:235:VAL:HG13	1:A:236:ALA:H	1.63	0.64
1:A:60:LYS:HB3	1:A:61:PRO:CD	2.27	0.64
1:A:163:THR:O	1:A:163:THR:CG2	2.29	0.64
1:A:312:GLU:N	1:A:312:GLU:OE1	2.30	0.64
1:B:98:THR:CG2	1:B:100:ARG:HG3	2.28	0.64
1:A:322:CYS:SG	1:A:326:ARG:HB2	2.38	0.63
1:B:250:ALA:HA	1:B:256:GLY:HA3	1.80	0.63
1:B:366:ASP:OD1	1:B:368:SER:OG	2.16	0.63
1:B:60:LYS:HB3	1:B:61:PRO:CD	2.27	0.63
1:B:95:MET:O	1:B:98:THR:CB	2.33	0.63
1:A:90:VAL:HG21	2:A:416:NM7:HAI	1.79	0.62
1:A:18:PRO:HG3	1:A:26:SER:HB3	1.80	0.62
1:B:128:LEU:CD2	1:B:137:THR:HG22	2.29	0.62
1:B:406:GLU:N	1:B:406:GLU:OE1	2.29	0.62
1:A:172:LEU:HD12	1:A:274:MET:HG2	1.81	0.62
1:A:226:ASN:HB3	1:A:228:ASP:N	2.13	0.62
1:B:325:GLU:CD	1:B:325:GLU:H	2.03	0.61
1:B:370:PHE:O	1:B:371:ASP:C	2.39	0.61
1:B:137:THR:HG22	1:B:137:THR:O	2.00	0.61
1:B:332:GLY:C	1:B:334:GLU:H	2.04	0.61
1:A:396:LEU:N	1:A:397:PRO:HD3	2.16	0.61
1:B:80:LYS:CD	1:B:367:THR:HG21	2.15	0.61
1:A:253:ASP:OD1	1:A:253:ASP:N	2.30	0.60
1:A:338:LYS:O	1:A:338:LYS:CG	2.47	0.60
1:A:161:LEU:HD21	1:A:274:MET:HE2	1.83	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:108:ASN:O	1:B:112:MET:HG2	2.02	0.60
1:B:80:LYS:HD3	1:B:367:THR:CG2	2.16	0.60
1:B:87:PHE:N	1:B:87:PHE:CD2	2.69	0.60
1:B:405:THR:HG23	1:B:406:GLU:N	2.18	0.59
1:A:25:LEU:HD12	1:B:62:PHE:CD2	2.38	0.59
1:B:204:ASP:OD1	1:B:204:ASP:N	2.29	0.59
1:B:160:ASP:C	1:B:160:ASP:OD1	2.41	0.59
1:B:323:SER:OG	1:B:325:GLU:OE1	2.17	0.59
1:A:96:LYS:O	1:A:97:ASN:HB2	2.03	0.59
1:B:15:LEU:HA	1:B:415:LEU:HD12	1.84	0.59
1:B:94:LYS:HB3	1:B:101:ILE:HD13	1.85	0.59
1:A:364:PRO:CD	1:A:365:SER:H	2.15	0.58
1:B:166:SER:OG	1:B:167:LYS:HG2	2.03	0.58
1:B:98:THR:HG21	1:B:100:ARG:CB	2.33	0.58
1:B:282:TYR:CD2	1:B:283:ALA:N	2.71	0.58
1:A:216:LEU:HD12	1:A:217:ALA:H	1.68	0.58
1:B:10:LEU:HD12	1:B:10:LEU:O	2.03	0.58
1:B:282:TYR:C	1:B:282:TYR:HD2	2.03	0.58
1:B:194:LEU:O	1:B:195:HIS:HB2	2.03	0.58
1:B:44:SER:O	1:B:45:ALA:CB	2.51	0.57
1:B:360:ASP:C	1:B:361:VAL:CG1	2.73	0.57
1:A:255:MET:O	6:A:457:HOH:O	2.17	0.57
1:B:137:THR:O	1:B:137:THR:CG2	2.53	0.57
1:A:37:LEU:HD13	1:B:37:LEU:HD13	1.86	0.56
1:A:108:ASN:O	1:A:112:MET:HG2	2.04	0.56
1:B:321:ILE:O	1:B:321:ILE:HG22	2.05	0.56
1:B:272:TYR:CD1	1:B:280:PRO:HD3	2.40	0.56
1:A:169:GLU:O	1:A:170:ASP:HB2	2.06	0.56
1:A:83:GLY:HA3	2:A:416:NM7:CAG	2.36	0.56
1:B:173:PRO:HG2	1:B:176:MET:HB2	1.88	0.56
1:A:189:ASP:O	1:A:193:GLN:HG2	2.07	0.55
1:B:214:ILE:O	1:B:351:ARG:NH2	2.39	0.54
1:B:20:ARG:O	1:B:21:ASN:C	2.40	0.54
1:A:195:HIS:HA	1:A:225:MET:CE	2.31	0.54
1:A:204:ASP:OD1	1:A:204:ASP:N	2.40	0.54
1:A:160:ASP:OD1	1:A:162:LEU:N	2.40	0.54
1:B:312:GLU:OE1	1:B:312:GLU:N	2.30	0.54
1:A:133:CYS:O	1:A:215:ARG:NH1	2.41	0.53
1:B:332:GLY:O	1:B:334:GLU:N	2.41	0.53
1:A:220:GLY:HA3	3:A:417:EDO:H11	1.91	0.53
1:A:44:SER:O	1:A:47:ARG:HG3	2.07	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:332:GLY:C	1:B:334:GLU:N	2.58	0.53
1:A:199:ARG:HH11	1:A:237:VAL:HG21	1.71	0.53
1:B:98:THR:HG22	1:B:99:GLU:N	2.22	0.53
1:A:295:ASN:ND2	1:A:295:ASN:O	2.37	0.53
1:B:104:MET:SD	1:B:106:ILE:HD11	2.49	0.53
1:B:295:ASN:CG	1:B:295:ASN:O	2.47	0.52
1:B:163:THR:O	1:B:167:LYS:HG3	2.09	0.52
1:B:183:GLU:HB3	1:B:214:ILE:HG12	1.91	0.52
1:B:232:GLN:HG3	1:B:257:LYS:HG2	1.92	0.52
1:A:366:ASP:OD2	1:A:368:SER:OG	2.21	0.52
1:B:293:ILE:O	1:B:296:HIS:HB3	2.10	0.52
1:A:60:LYS:O	1:A:64:GLN:HB2	2.10	0.52
1:A:104:MET:HE2	1:A:152:VAL:CG2	2.40	0.52
1:A:177:ALA:O	1:A:181:ILE:HG12	2.10	0.51
1:A:327:ARG:HG2	1:A:328:LEU:O	2.11	0.51
1:B:169:GLU:O	1:B:170:ASP:HB2	2.09	0.51
1:A:194:LEU:O	1:A:195:HIS:CB	2.54	0.51
1:B:60:LYS:CB	1:B:61:PRO:CD	2.86	0.51
1:A:316:LEU:HD12	1:A:316:LEU:O	2.10	0.51
1:B:45:ALA:C	1:B:47:ARG:H	2.14	0.50
1:A:334:GLU:OE2	1:A:337:LYS:CD	2.58	0.50
1:B:370:PHE:O	1:B:371:ASP:O	2.30	0.50
1:B:371:ASP:O	1:B:371:ASP:OD2	2.29	0.50
1:A:195:HIS:C	1:A:225:MET:CE	2.79	0.50
1:B:360:ASP:O	1:B:361:VAL:CG1	2.59	0.50
1:B:25:LEU:HD22	1:B:29:THR:HG21	1.94	0.49
1:B:60:LYS:N	1:B:61:PRO:CD	2.74	0.49
1:B:28:GLU:OE1	1:B:404:THR:HG23	2.11	0.49
1:A:232:GLN:HG2	1:A:255:MET:HG3	1.95	0.49
1:B:38:TYR:OH	1:B:60:LYS:HG3	2.12	0.49
1:B:109:LYS:O	1:B:112:MET:HB2	2.12	0.49
1:B:60:LYS:O	1:B:64:GLN:HB2	2.12	0.48
1:A:46:LEU:C	1:A:48:ARG:N	2.66	0.48
1:A:195:HIS:CA	1:A:225:MET:HE3	2.33	0.48
1:B:78:ILE:HA	1:B:93:VAL:HG12	1.95	0.48
1:A:40:GLU:CD	1:A:393:GLY:HA2	2.30	0.48
1:A:202:LYS:HE3	1:A:204:ASP:HB2	1.94	0.48
1:B:198:HIS:HA	1:B:222:CYS:SG	2.54	0.48
1:B:371:ASP:C	1:B:371:ASP:OD2	2.52	0.48
1:B:172:LEU:HD22	1:B:176:MET:SD	2.53	0.48
1:A:241:ASP:OD1	1:A:241:ASP:N	2.45	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:46:LEU:N	1:A:46:LEU:HD23	2.28	0.48
1:B:360:ASP:C	1:B:361:VAL:HG13	2.33	0.48
1:A:83:GLY:HA3	2:A:416:NM7:CAO	2.44	0.47
1:B:112:MET:HE2	1:B:119:ALA:HB1	1.95	0.47
1:A:207:LEU:H	1:A:207:LEU:HG	1.52	0.47
1:B:304:SER:O	1:B:305:HIS:HB2	2.14	0.47
1:A:187:ALA:O	1:A:190:SER:HB3	2.15	0.47
1:A:365:SER:O	1:A:365:SER:OG	2.30	0.46
1:B:197:VAL:HG22	1:B:260:PRO:HA	1.97	0.46
1:B:396:LEU:N	1:B:397:PRO:CD	2.78	0.46
1:A:405:THR:HG23	1:A:406:GLU:N	2.30	0.46
1:B:46:LEU:HA	1:B:46:LEU:HD12	1.55	0.46
1:A:248:LEU:HD23	1:A:248:LEU:HA	1.68	0.46
1:B:46:LEU:O	1:B:47:ARG:C	2.53	0.46
1:A:60:LYS:CB	1:A:61:PRO:CD	2.92	0.46
1:B:202:LYS:HG3	1:B:204:ASP:OD1	2.16	0.46
1:A:246:GLU:HA	6:A:464:HOH:O	2.16	0.46
1:B:98:THR:CG2	1:B:100:ARG:CB	2.94	0.46
1:B:100:ARG:HG2	1:B:100:ARG:HH21	1.81	0.46
1:B:367:THR:O	1:B:367:THR:CG2	2.60	0.45
1:A:124:GLU:HG3	1:A:219:PHE:HB2	1.98	0.45
1:B:145:ASP:O	1:B:146:GLU:C	2.53	0.45
1:A:202:LYS:HB2	1:A:203:PRO:HD2	1.99	0.45
1:B:165:LEU:HD23	1:B:172:LEU:HG	1.99	0.45
1:A:286:LEU:HD12	1:A:286:LEU:HA	1.62	0.45
1:A:27:VAL:HB	1:A:409:PHE:HB3	1.98	0.45
1:A:90:VAL:CG1	2:A:416:NM7:HAI	2.45	0.45
1:B:282:TYR:HD2	1:B:282:TYR:O	2.00	0.45
1:A:295:ASN:O	1:A:298:GLU:N	2.49	0.45
1:B:98:THR:HG21	1:B:100:ARG:CG	2.47	0.45
1:B:112:MET:HE2	1:B:112:MET:HA	1.99	0.45
1:A:15:LEU:CD1	1:B:409:PHE:CZ	3.01	0.44
1:B:83:GLY:C	1:B:84:ARG:HG2	2.35	0.44
1:A:69:MET:CE	1:B:6:ARG:CG	2.95	0.44
1:B:165:LEU:O	1:B:170:ASP:N	2.49	0.44
1:B:189:ASP:O	1:B:193:GLN:HG2	2.17	0.44
1:B:98:THR:CG2	1:B:100:ARG:CG	2.95	0.44
1:A:90:VAL:CB	2:A:416:NM7:HAI	2.48	0.44
1:A:38:TYR:CD2	1:A:38:TYR:C	2.92	0.43
1:A:364:PRO:CD	1:A:365:SER:N	2.77	0.43
1:B:112:MET:HE2	1:B:119:ALA:CB	2.48	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:391:PHE:CD1	1:B:391:PHE:C	2.91	0.43
1:A:234:SER:HB3	1:A:255:MET:SD	2.59	0.43
1:B:328:LEU:CD2	1:B:335:ASP:HB3	2.48	0.43
1:A:407:SER:HA	1:B:11:GLU:OE2	2.19	0.43
1:B:203:PRO:HD3	1:B:242:TYR:CE2	2.52	0.43
1:A:137:THR:O	1:A:137:THR:HG22	2.17	0.43
1:B:98:THR:HG23	1:B:99:GLU:N	2.32	0.43
1:A:69:MET:HE3	1:B:6:ARG:CG	2.49	0.43
1:A:195:HIS:O	1:A:225:MET:HE2	2.19	0.43
1:B:45:ALA:C	1:B:47:ARG:N	2.72	0.43
1:B:322:CYS:SG	1:B:326:ARG:HB2	2.59	0.42
1:B:406:GLU:H	1:B:406:GLU:CD	2.19	0.42
1:B:71:LEU:HD23	1:B:71:LEU:HA	1.78	0.42
1:A:405:THR:HG23	1:A:406:GLU:HG3	2.01	0.42
1:B:363:SER:HA	1:B:364:PRO:HD2	1.87	0.42
1:A:172:LEU:HA	1:A:173:PRO:HD3	1.78	0.42
1:B:122:ARG:HB2	6:B:425:HOH:O	2.19	0.42
1:A:60:LYS:N	1:A:61:PRO:HD2	2.35	0.41
1:A:62:PHE:CD2	1:B:25:LEU:HD12	2.55	0.41
1:A:69:MET:CE	1:B:6:ARG:HG3	2.50	0.41
1:A:231:VAL:O	1:A:257:LYS:HA	2.20	0.41
1:B:394:LEU:HA	1:B:394:LEU:HD23	1.80	0.41
1:A:69:MET:CE	1:B:6:ARG:HG2	2.51	0.41
1:A:327:ARG:O	1:A:330:GLN:HG2	2.20	0.41
1:B:194:LEU:HD23	1:B:194:LEU:HA	1.87	0.41
1:B:405:THR:CG2	1:B:406:GLU:N	2.83	0.41
1:A:90:VAL:HG21	2:A:416:NM7:CAI	2.46	0.41
1:A:139:LEU:HD11	1:A:141:TYR:O	2.21	0.41
1:A:161:LEU:CD2	1:A:274:MET:HE1	2.44	0.41
1:B:112:MET:CE	1:B:119:ALA:HB1	2.50	0.41
1:B:272:TYR:CD1	1:B:272:TYR:C	2.94	0.41
1:A:232:GLN:HG2	1:A:255:MET:CG	2.50	0.41
1:A:202:LYS:HB2	1:A:203:PRO:CD	2.51	0.41
1:A:79:ILE:HD11	1:A:94:LYS:HB3	2.03	0.40
1:B:165:LEU:CD2	1:B:172:LEU:HG	2.50	0.40
1:A:113:LEU:HA	1:A:113:LEU:HD23	1.87	0.40
1:B:160:ASP:HA	1:B:207:LEU:HA	2.03	0.40
1:A:136:ILE:HG21	1:A:136:ILE:HD13	1.89	0.40
1:A:47:ARG:HG3	1:A:47:ARG:H	1.36	0.40
1:A:358:ILE:HA	1:A:359:PRO:HD2	1.95	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the sym-

metry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:80:LYS:NZ	1:B:331:ASN:OD1[1_655]	2.11	0.09

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	391/415 (94%)	377 (96%)	14 (4%)	0	100	100
1	B	392/415 (94%)	378 (96%)	13 (3%)	1 (0%)	41	56
All	All	783/830 (94%)	755 (96%)	27 (3%)	1 (0%)	51	69

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	195	HIS

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	321/368 (87%)	284 (88%)	37 (12%)	5	7
1	B	321/368 (87%)	271 (84%)	50 (16%)	2	2
All	All	642/736 (87%)	555 (86%)	87 (14%)	3	5

All (87) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	8	LYS
1	A	13	LEU
1	A	15	LEU
1	A	44	SER
1	A	47	ARG
1	A	64	GLN
1	A	77	GLU
1	A	94	LYS
1	A	125	ARG
1	A	132	ASP
1	A	137	THR
1	A	160	ASP
1	A	170	ASP
1	A	204	ASP
1	A	207	LEU
1	A	216	LEU
1	A	224	LYS
1	A	237	VAL
1	A	243	ILE
1	A	244	SER
1	A	253	ASP
1	A	255	MET
1	A	285	SER
1	A	286	LEU
1	A	287	VAL
1	A	295	ASN
1	A	297	GLU
1	A	323	SER
1	A	326	ARG
1	A	330	GLN
1	A	358	ILE
1	A	360	ASP
1	A	371	ASP
1	A	404	THR
1	A	406	GLU
1	A	410	SER
1	A	414	SER
1	B	4	LYS
1	B	7	LEU
1	B	8	LYS
1	B	26	SER
1	B	31	LEU
1	B	44	SER

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Mol	Chain	Res	Type
1	B	46	LEU
1	B	54	GLU
1	B	56	LEU
1	B	60	LYS
1	B	64	GLN
1	B	82	ILE
1	B	84	ARG
1	B	87	PHE
1	B	125	ARG
1	B	133	CYS
1	B	137	THR
1	B	139	LEU
1	B	169	GLU
1	B	171	LYS
1	B	176	MET
1	B	202	LYS
1	B	204	ASP
1	B	207	LEU
1	B	214	ILE
1	B	215	ARG
1	B	224	LYS
1	B	235	VAL
1	B	261	GLU
1	B	278	GLU
1	B	279	THR
1	B	282	TYR
1	B	286	LEU
1	B	295	ASN
1	B	297	GLU
1	B	317	ILE
1	B	324	ARG
1	B	330	GLN
1	B	334	GLU
1	B	345	LEU
1	B	364	PRO
1	B	365	SER
1	B	368	SER
1	B	369	ASN
1	B	371	ASP
1	B	404	THR
1	B	406	GLU
1	B	410	SER

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Mol	Chain	Res	Type
1	B	414	SER
1	B	415	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	64	GLN
1	A	72	HIS
1	A	134	GLN
1	A	211	ASN
1	A	232	GLN
1	A	249	GLN
1	A	295	ASN
1	B	70	GLN
1	B	211	ASN
1	B	232	GLN
1	B	369	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.

5.6 Ligand geometry ⓘ

Of 8 ligands modelled in this entry, 3 are monoatomic - leaving 5 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	#$|Z| > 2$
2	NM7	B	416	-	16,20,20	2.91	4 (25%)	14,28,28	1.11	1 (7%)
3	EDO	B	421	-	3,3,3	0.45	0	2,2,2	0.07	0
3	EDO	A	417	-	3,3,3	0.65	0	2,2,2	0.11	0
2	NM7	A	416	-	16,20,20	3.60	4 (25%)	14,28,28	1.24	2 (14%)
3	EDO	B	420	-	3,3,3	0.52	0	2,2,2	0.31	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	NM7	B	416	-	-	0/3/12/12	0/2/2/2
3	EDO	B	421	-	-	1/1/1/1	-
3	EDO	A	417	-	-	0/1/1/1	-
2	NM7	A	416	-	-	0/3/12/12	0/2/2/2
3	EDO	B	420	-	-	1/1/1/1	-

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	416	NM7	CAR-CAN	-12.25	1.33	1.50
2	B	416	NM7	CAR-CAN	-10.07	1.36	1.50
2	A	416	NM7	CAS-SAL	-5.19	1.64	1.72
2	A	416	NM7	CAR-CAS	-3.71	1.34	1.41
2	B	416	NM7	CAR-CAS	-2.61	1.36	1.41
2	B	416	NM7	FAE-CAO	2.51	1.42	1.36
2	B	416	NM7	CAS-SAL	2.38	1.76	1.72
2	A	416	NM7	CAJ-CAQ	-2.06	1.34	1.42

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	416	NM7	CAG-CAO-CAF	-2.11	120.03	122.80
2	A	416	NM7	CAR-CAN-NAB	-2.09	115.04	118.29
2	B	416	NM7	CAG-CAO-CAF	-2.07	120.09	122.80

There are no chirality outliers.
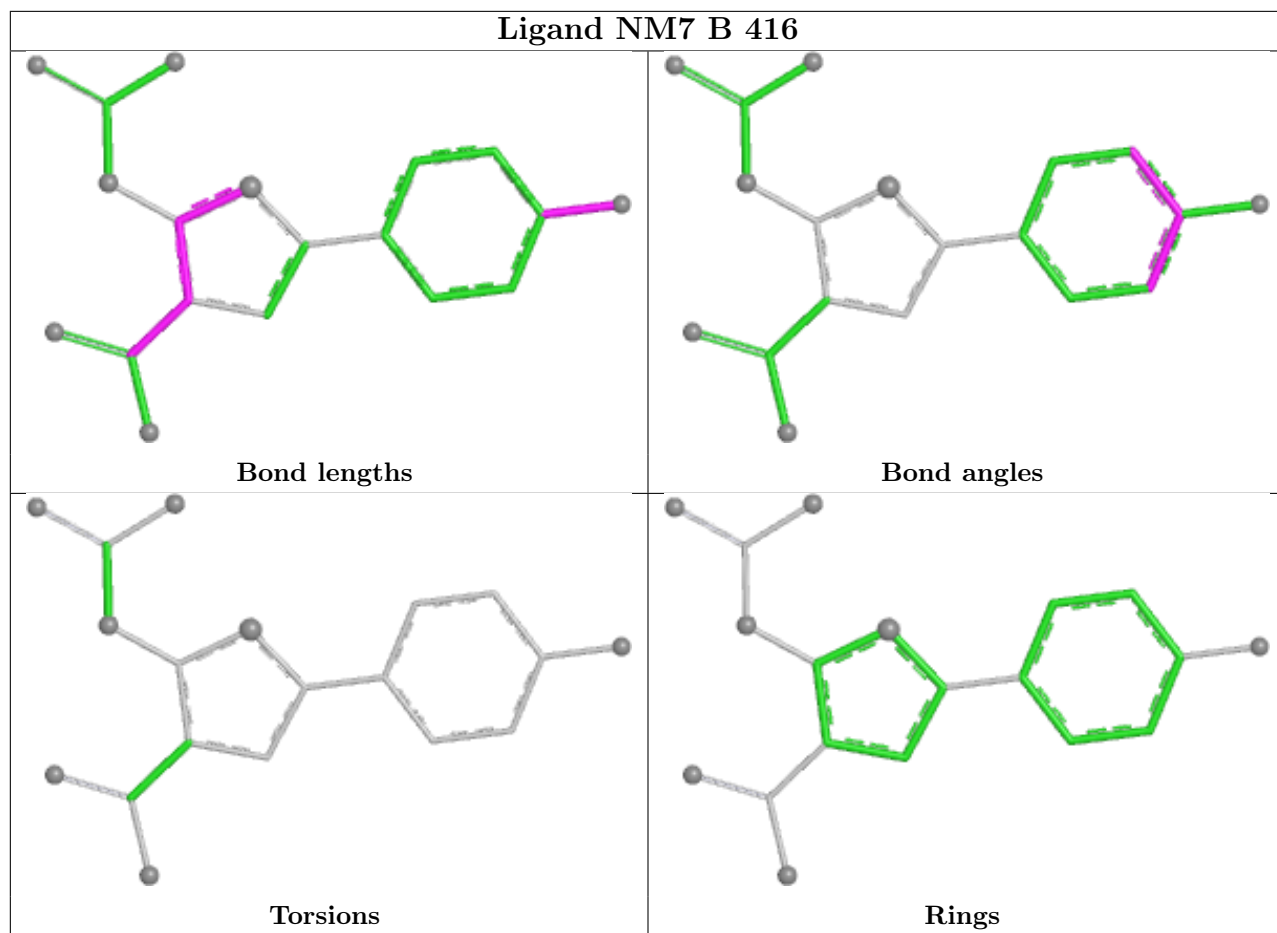
All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	420	EDO	O1-C1-C2-O2
3	B	421	EDO	O1-C1-C2-O2

There are no ring outliers.

4 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	416	NM7	1	0
3	B	421	EDO	1	0
3	A	417	EDO	1	0
2	A	416	NM7	10	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 NM7 B 416

Bond lengths

Bond angles

Torsions

Rings

Ligand NM7 A 416

Bond lengths

Bond angles

Torsions

Rings
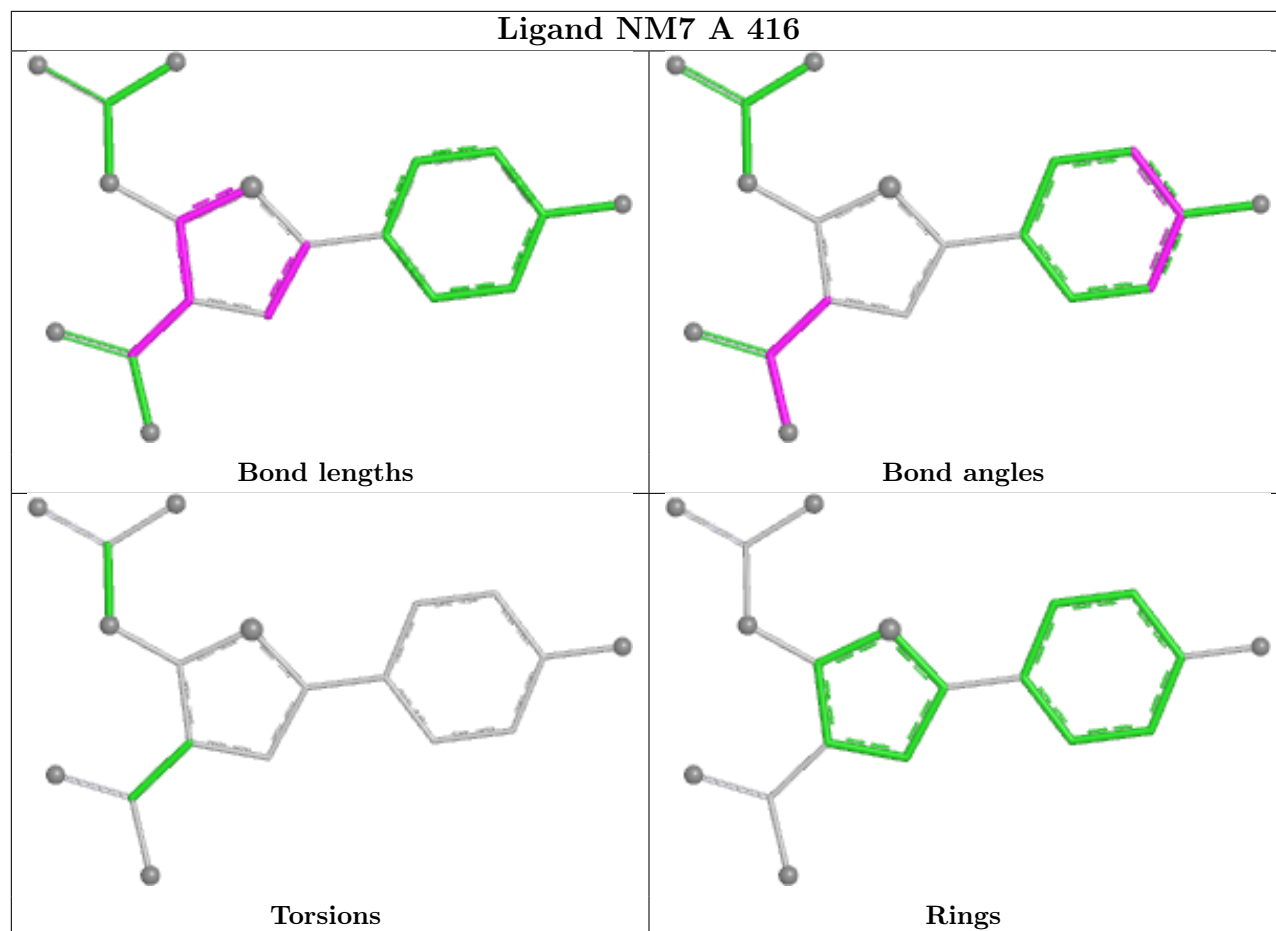
5.7 Other polymers ⓘ

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	395/415 (95%)	-0.15	2 (0%)	91	91	17, 41, 67, 80	0
1	B	396/415 (95%)	-0.12	7 (1%)	68	65	16, 43, 71, 94	0
All	All	791/830 (95%)	-0.14	9 (1%)	80	79	16, 42, 70, 94	0

All (9) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	43	HIS	4.1
1	B	295	ASN	3.3
1	A	44	SER	2.4
1	B	44	SER	2.3
1	B	85	GLY	2.2
1	B	297	GLU	2.2
1	B	299	ARG	2.1
1	B	254	GLY	2.1
1	B	251	MET	2.1

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

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

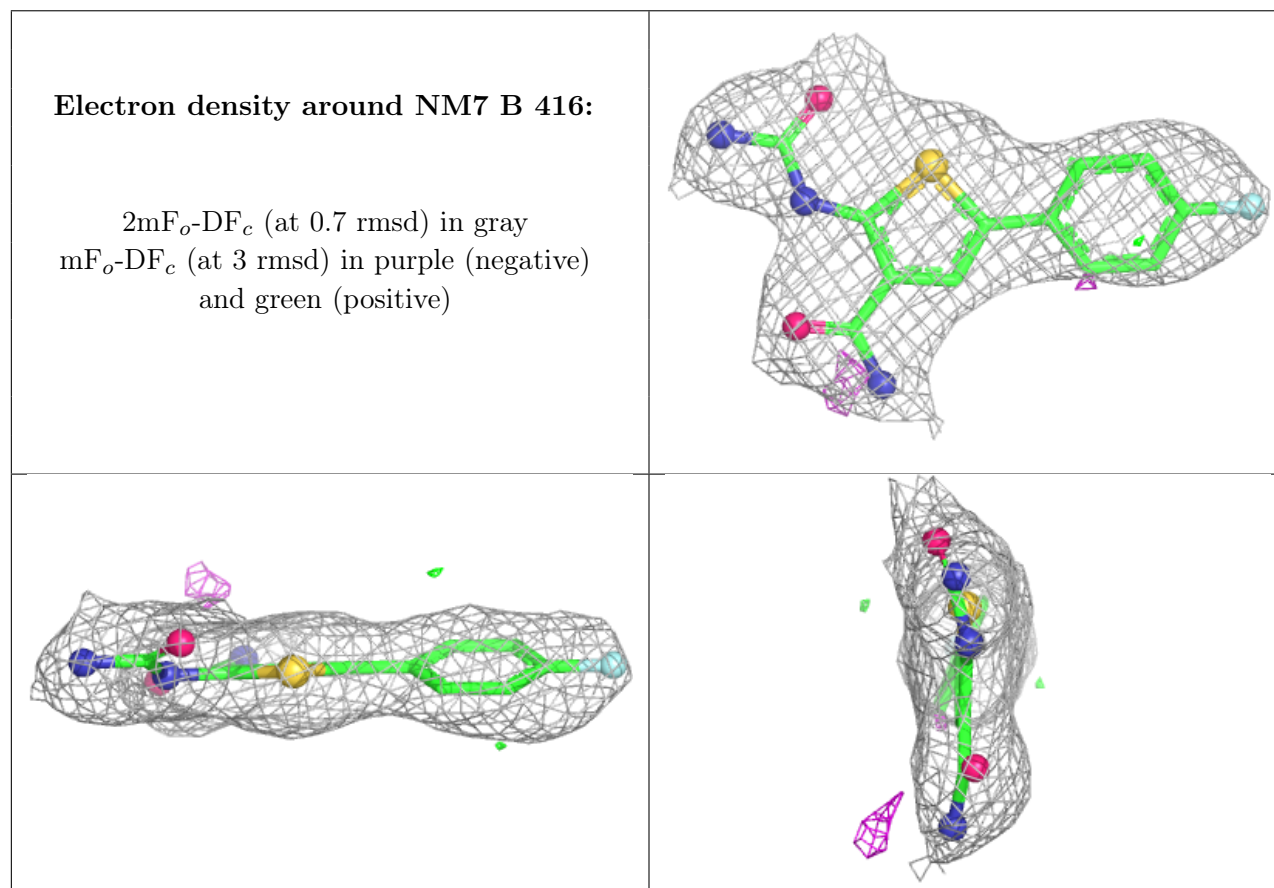## 6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.
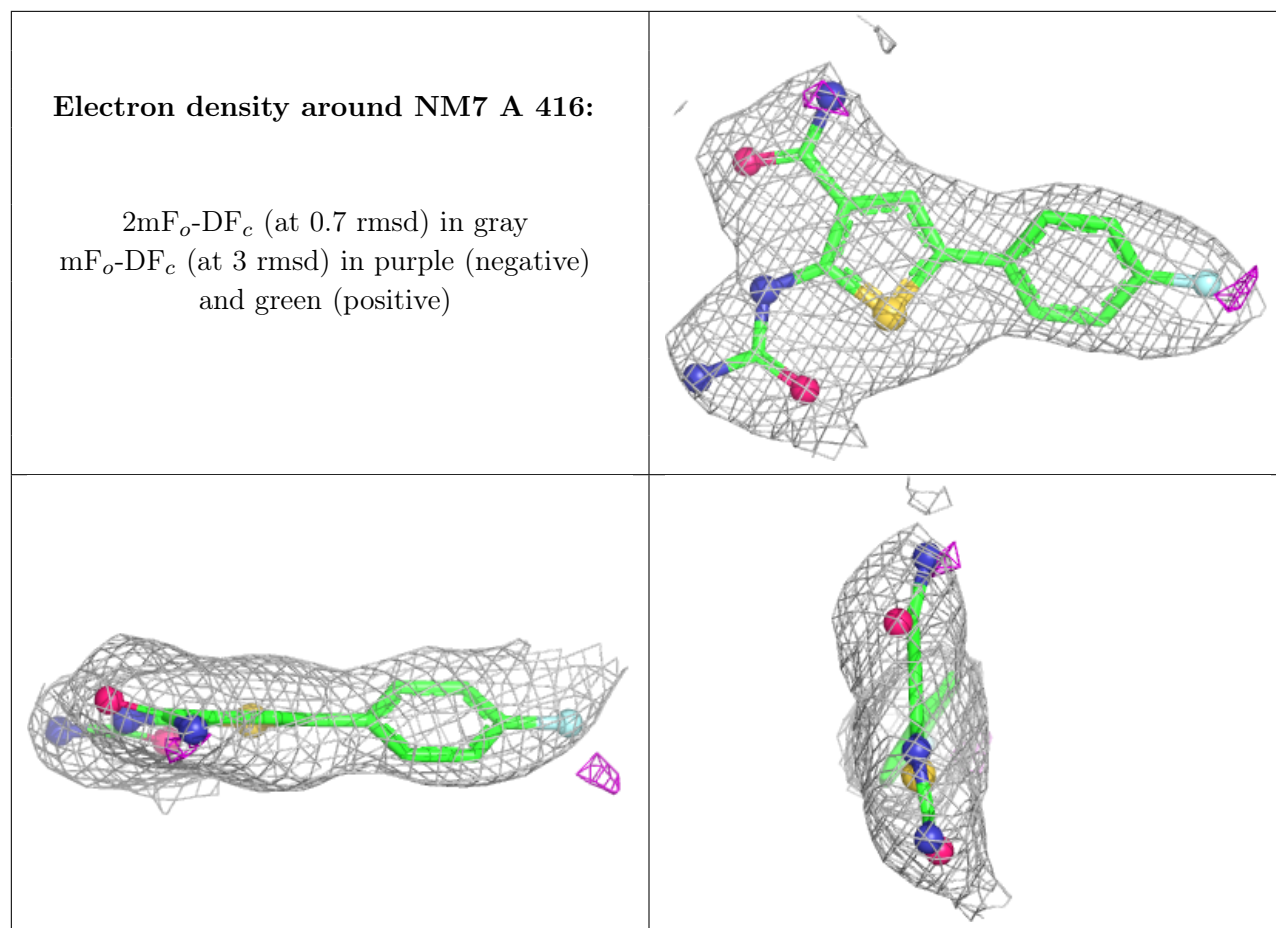
6.4 Ligands ⓘ

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
3	EDO	B	420	4/4	0.78	0.16	69,71,71,71	0
3	EDO	A	417	4/4	0.82	0.32	42,46,50,51	0
4	CL	B	417	1/1	0.91	0.20	56,56,56,56	0
2	NM7	B	416	19/19	0.94	0.16	22,34,47,50	0
2	NM7	A	416	19/19	0.94	0.16	27,41,45,45	0
3	EDO	B	421	4/4	0.96	0.21	33,33,34,38	0
4	CL	B	418	1/1	0.96	0.24	57,57,57,57	0
5	MG	B	419	1/1	0.96	0.13	26,26,26,26	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 NM7 B 416:

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

Electron density around NM7 A 416:

$2mF_o$-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.