



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 12, 2026 – 03:17 PM UTC

PDB ID : 6OF8 / pdb_00006of8
Title : Structure of Thr354Asn, Glu355Gln, Thr412Asn, Ile414Met, Ile464His, and Phe467Met mutant human CamKII-alpha hub domain
Authors : McSpadden, E.D.; Chi, C.C.; Gee, C.L.; Kuriyan, J.
Deposited on : 2019-03-28
Resolution : 2.10 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)
Xtrriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

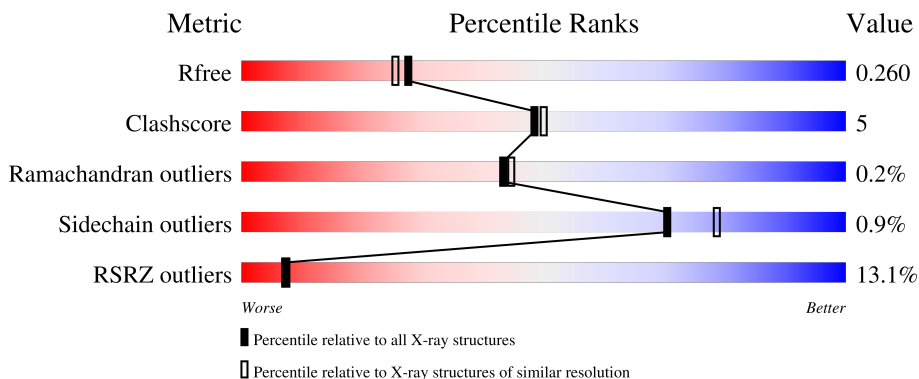
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 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.



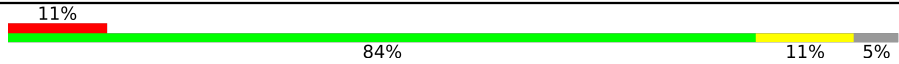

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	6658 (2.10-2.10)
Clashscore	190562	7164 (2.10-2.10)
Ramachandran outliers	187476	7099 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)
RSRZ outliers	180081	6662 (2.10-2.10)

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 $\leq 5\%$. 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	135	 12% 88% 9%
1	B	135	 6% 84% 12%
1	C	135	 16% 83% 11%
1	D	135	 13% 80% 16%
1	E	135	 10% 81% 16%

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Mol	Chain	Length	Quality of chain
1	F	135	 <p>11% 84% 11% 5%</p>
1	G	135	 <p>20% 75% 17% 7%</p>

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 7486 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 Calcium/calmodulin-dependent protein kinase type II subunit alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	F	128	1042	653	192	190	7	0	0	0
1	B	130	1060	664	196	192	8	0	0	0
1	C	130	1060	664	196	192	8	0	0	0
1	G	125	1020	642	186	184	8	0	0	0
1	E	130	1055	661	194	193	7	0	0	0
1	A	131	1067	669	197	193	8	0	0	0
1	D	130	1054	662	192	192	8	0	0	0

There are 70 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	341	GLY	-	expression tag	UNP Q9UQM7
F	342	PRO	-	expression tag	UNP Q9UQM7
F	343	HIS	-	expression tag	UNP Q9UQM7
F	344	MET	-	expression tag	UNP Q9UQM7
F	354	ASN	THR	engineered mutation	UNP Q9UQM7
F	355	GLN	GLU	engineered mutation	UNP Q9UQM7
F	412	ASN	THR	engineered mutation	UNP Q9UQM7
F	414	MET	ILE	engineered mutation	UNP Q9UQM7
F	464	HIS	ILE	engineered mutation	UNP Q9UQM7
F	467	MET	PHE	engineered mutation	UNP Q9UQM7
B	341	GLY	-	expression tag	UNP Q9UQM7
B	342	PRO	-	expression tag	UNP Q9UQM7
B	343	HIS	-	expression tag	UNP Q9UQM7
B	344	MET	-	expression tag	UNP Q9UQM7

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Chain	Residue	Modelled	Actual	Comment	Reference
B	354	ASN	THR	engineered mutation	UNP Q9UQM7
B	355	GLN	GLU	engineered mutation	UNP Q9UQM7
B	412	ASN	THR	engineered mutation	UNP Q9UQM7
B	414	MET	ILE	engineered mutation	UNP Q9UQM7
B	464	HIS	ILE	engineered mutation	UNP Q9UQM7
B	467	MET	PHE	engineered mutation	UNP Q9UQM7
C	341	GLY	-	expression tag	UNP Q9UQM7
C	342	PRO	-	expression tag	UNP Q9UQM7
C	343	HIS	-	expression tag	UNP Q9UQM7
C	344	MET	-	expression tag	UNP Q9UQM7
C	354	ASN	THR	engineered mutation	UNP Q9UQM7
C	355	GLN	GLU	engineered mutation	UNP Q9UQM7
C	412	ASN	THR	engineered mutation	UNP Q9UQM7
C	414	MET	ILE	engineered mutation	UNP Q9UQM7
C	464	HIS	ILE	engineered mutation	UNP Q9UQM7
C	467	MET	PHE	engineered mutation	UNP Q9UQM7
G	341	GLY	-	expression tag	UNP Q9UQM7
G	342	PRO	-	expression tag	UNP Q9UQM7
G	343	HIS	-	expression tag	UNP Q9UQM7
G	344	MET	-	expression tag	UNP Q9UQM7
G	354	ASN	THR	engineered mutation	UNP Q9UQM7
G	355	GLN	GLU	engineered mutation	UNP Q9UQM7
G	412	ASN	THR	engineered mutation	UNP Q9UQM7
G	414	MET	ILE	engineered mutation	UNP Q9UQM7
G	464	HIS	ILE	engineered mutation	UNP Q9UQM7
G	467	MET	PHE	engineered mutation	UNP Q9UQM7
E	341	GLY	-	expression tag	UNP Q9UQM7
E	342	PRO	-	expression tag	UNP Q9UQM7
E	343	HIS	-	expression tag	UNP Q9UQM7
E	344	MET	-	expression tag	UNP Q9UQM7
E	354	ASN	THR	engineered mutation	UNP Q9UQM7
E	355	GLN	GLU	engineered mutation	UNP Q9UQM7
E	412	ASN	THR	engineered mutation	UNP Q9UQM7
E	414	MET	ILE	engineered mutation	UNP Q9UQM7
E	464	HIS	ILE	engineered mutation	UNP Q9UQM7
E	467	MET	PHE	engineered mutation	UNP Q9UQM7
A	341	GLY	-	expression tag	UNP Q9UQM7
A	342	PRO	-	expression tag	UNP Q9UQM7
A	343	HIS	-	expression tag	UNP Q9UQM7
A	344	MET	-	expression tag	UNP Q9UQM7
A	354	ASN	THR	engineered mutation	UNP Q9UQM7
A	355	GLN	GLU	engineered mutation	UNP Q9UQM7

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Chain	Residue	Modelled	Actual	Comment	Reference
A	412	ASN	THR	engineered mutation	UNP Q9UQM7
A	414	MET	ILE	engineered mutation	UNP Q9UQM7
A	464	HIS	ILE	engineered mutation	UNP Q9UQM7
A	467	MET	PHE	engineered mutation	UNP Q9UQM7
D	341	GLY	-	expression tag	UNP Q9UQM7
D	342	PRO	-	expression tag	UNP Q9UQM7
D	343	HIS	-	expression tag	UNP Q9UQM7
D	344	MET	-	expression tag	UNP Q9UQM7
D	354	ASN	THR	engineered mutation	UNP Q9UQM7
D	355	GLN	GLU	engineered mutation	UNP Q9UQM7
D	412	ASN	THR	engineered mutation	UNP Q9UQM7
D	414	MET	ILE	engineered mutation	UNP Q9UQM7
D	464	HIS	ILE	engineered mutation	UNP Q9UQM7
D	467	MET	PHE	engineered mutation	UNP Q9UQM7

- Molecule 2 is POTASSIUM ION (CCD ID: K) (formula: K).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	F	2	Total K 2 2	0	0
2	E	1	Total K 1 1	0	0
2	A	1	Total K 1 1	0	0
2	D	1	Total K 1 1	0	0

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



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

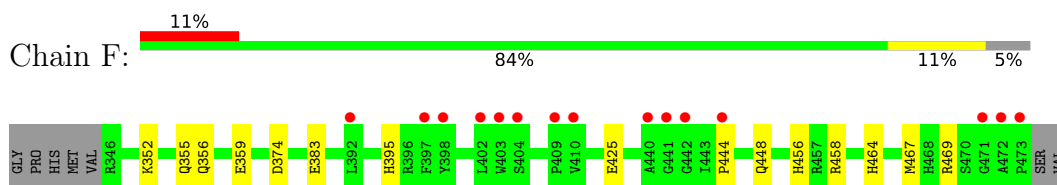
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	F	20	Total O 20 20	0	0
4	B	22	Total O 22 22	0	0
4	C	10	Total O 10 10	0	0
4	G	10	Total O 10 10	0	0
4	E	19	Total O 19 19	0	0
4	A	12	Total O 12 12	0	0
4	D	12	Total O 12 12	0	0

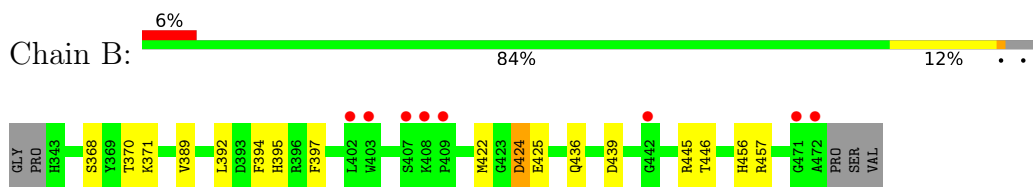
3 Residue-property plots [i](#)

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.

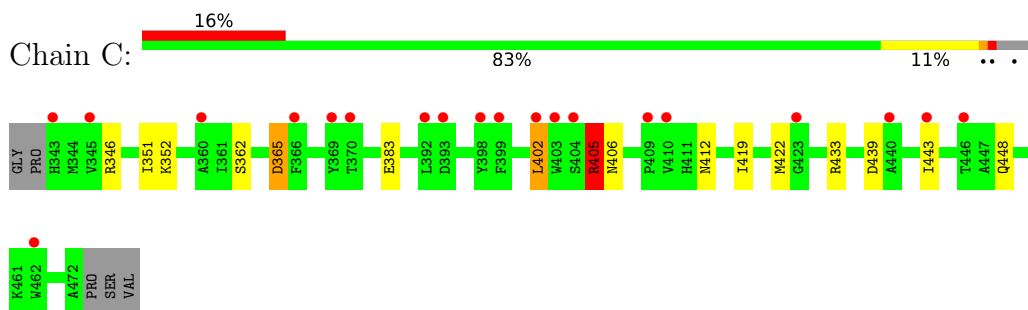
- Molecule 1: Calcium/calmodulin-dependent protein kinase type II subunit alpha



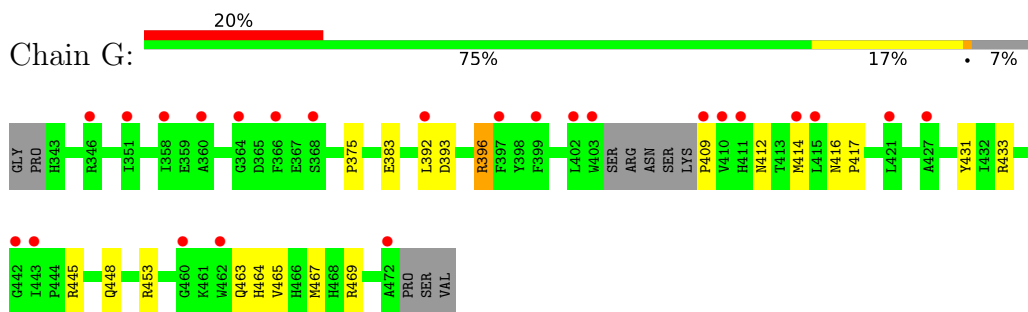
- Molecule 1: Calcium/calmodulin-dependent protein kinase type II subunit alpha



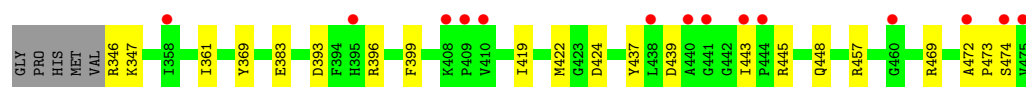
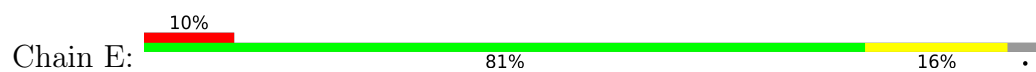
- Molecule 1: Calcium/calmodulin-dependent protein kinase type II subunit alpha



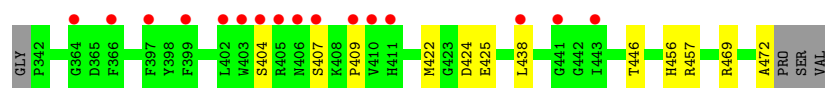
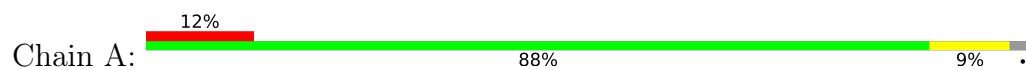
- Molecule 1: Calcium/calmodulin-dependent protein kinase type II subunit alpha



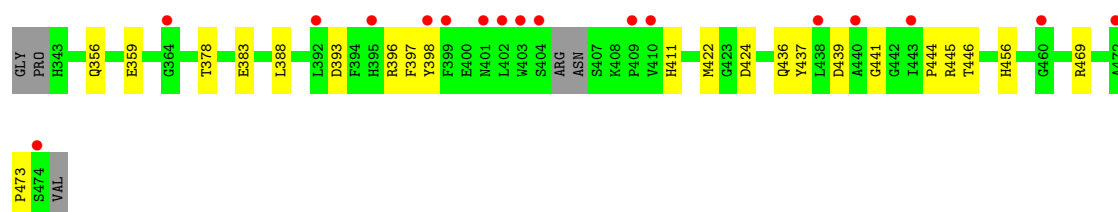
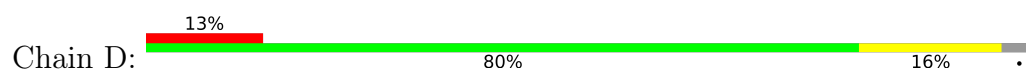
- Molecule 1: Calcium/calmodulin-dependent protein kinase type II subunit alpha



- Molecule 1: Calcium/calmodulin-dependent protein kinase type II subunit alpha



- Molecule 1: Calcium/calmodulin-dependent protein kinase type II subunit alpha



4 Data and refinement statistics i

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	162.99Å 121.34Å 56.24Å 90.00° 108.15° 90.00°	Depositor
Resolution (Å)	47.51 – 2.10 47.51 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.6 (47.51-2.10) 99.6 (47.51-2.10)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.58 (at 2.10Å)	Xtrriage
Refinement program	PHENIX (1.14_3260: ???)	Depositor
R, R_{free}	0.222 , 0.258 0.225 , 0.260	Depositor DCC
R_{free} test set	3075 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å ²)	49.0	Xtrriage
Anisotropy	0.202	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 54.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.020 for -h-2*1,-k,l	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	7486	wwPDB-VP
Average B, all atoms (Å ²)	66.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.02% 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: K, GOL

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	0.12	0/1096	0.34	0/1480
1	B	0.12	0/1088	0.32	0/1469
1	C	0.13	0/1088	0.39	0/1469
1	D	0.10	0/1082	0.31	0/1461
1	E	0.12	0/1083	0.33	0/1464
1	F	0.13	0/1070	0.34	0/1446
1	G	0.10	0/1047	0.30	0/1413
All	All	0.11	0/7554	0.33	0/10202

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	1067	0	1021	8	0
1	B	1060	0	1013	14	0
1	C	1060	0	1013	14	0
1	D	1054	0	1005	14	0
1	E	1055	0	1009	14	0
1	F	1042	0	995	10	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	G	1020	0	971	14	0
2	A	1	0	0	0	0
2	D	1	0	0	0	0
2	E	1	0	0	0	0
2	F	2	0	0	0	0
3	A	6	0	8	0	0
3	C	6	0	8	2	0
3	E	6	0	8	2	0
4	A	12	0	0	0	0
4	B	22	0	0	1	0
4	C	10	0	0	0	0
4	D	12	0	0	0	0
4	E	19	0	0	0	0
4	F	20	0	0	1	0
4	G	10	0	0	1	0
All	All	7486	0	7051	79	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 5.

All (79) 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:F:374:ASP:OD2	1:F:458:ARG:NH2	2.24	0.69
1:F:395:HIS:ND1	4:F:601:HOH:O	2.26	0.68
1:D:411:HIS:HB3	1:D:436:GLN:HB2	1.77	0.65
1:B:456:HIS:HB2	1:A:422:MET:HG2	1.77	0.64
1:G:409:PRO:HB2	1:G:438:LEU:HD13	1.81	0.63
1:B:425:GLU:N	1:B:425:GLU:OE2	2.30	0.62
1:F:448:GLN:HE22	3:C:501:GOL:H12	1.65	0.62
1:D:393:ASP:OD1	1:D:396:ARG:NH2	2.35	0.60
1:B:424:ASP:O	1:B:457:ARG:NH1	2.35	0.58
1:D:439:ASP:OD2	1:D:441:GLY:N	2.34	0.57
1:E:393:ASP:OD2	1:E:396:ARG:NH2	2.38	0.56
1:A:425:GLU:HG2	1:A:457:ARG:HB3	1.88	0.56
1:B:436:GLN:HG2	1:B:446:THR:HG22	1.87	0.56
1:B:439:ASP:OD2	1:B:445:ARG:NH1	2.39	0.56
1:C:346:ARG:H	1:C:346:ARG:HD2	1.73	0.54
1:C:422:MET:HG2	1:D:456:HIS:CG	2.43	0.53
1:F:456:HIS:HB2	1:E:422:MET:HG2	1.90	0.53
1:C:402:LEU:O	1:C:405:ARG:N	2.31	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:412:ASN:OD1	1:C:433:ARG:NH1	2.38	0.52
1:D:378:THR:HB	1:D:388:LEU:HD11	1.92	0.51
1:G:414:MET:HG2	1:G:417:PRO:HG3	1.93	0.51
1:E:424:ASP:O	1:E:457:ARG:NH2	2.37	0.51
1:D:436:GLN:HG2	1:D:446:THR:HG22	1.93	0.50
1:E:437:TYR:CZ	1:E:445:ARG:HB2	2.47	0.50
1:C:433:ARG:HE	1:C:451:GLU:CD	2.20	0.49
1:G:439:ASP:C	1:G:441:GLY:H	2.20	0.49
1:E:347:LYS:HB3	1:E:419:ILE:HD12	1.95	0.49
1:A:469:ARG:HH12	1:A:472:ALA:C	2.21	0.49
1:E:469:ARG:NH1	1:E:472:ALA:O	2.40	0.48
1:C:405:ARG:HB3	1:C:406:ASN:H	1.47	0.48
1:B:370:THR:HG22	1:B:392:LEU:HD22	1.96	0.48
1:E:448:GLN:NE2	3:E:501:GOL:O2	2.44	0.47
1:B:368:SER:HA	1:B:371:LYS:HD3	1.97	0.47
1:F:355:GLN:O	1:F:359:GLU:HG2	2.14	0.47
1:B:389:VAL:HG11	1:B:394:PHE:HB2	1.97	0.47
1:A:409:PRO:HD2	1:A:438:LEU:HD12	1.97	0.46
1:F:425:GLU:N	1:F:425:GLU:OE1	2.47	0.46
1:G:437:TYR:CZ	1:G:445:ARG:HB2	2.50	0.46
1:C:448:GLN:HE22	3:C:501:GOL:H2	1.80	0.46
1:C:439:ASP:OD2	1:C:443:ILE:HB	2.15	0.46
1:E:439:ASP:OD2	1:E:443:ILE:N	2.48	0.46
1:B:422:MET:HG2	1:A:456:HIS:HB2	1.97	0.46
1:B:424:ASP:OD1	1:B:424:ASP:N	2.49	0.45
1:G:453:ARG:HD3	1:G:464:HIS:NE2	2.31	0.45
1:A:404:SER:HB2	1:A:407:SER:HB3	1.97	0.45
1:E:469:ARG:NH2	1:E:474:SER:H	2.15	0.45
1:B:397:PHE:HE2	1:D:444:PRO:HB3	1.82	0.45
1:G:463:GLN:NE2	4:G:502:HOH:O	2.49	0.45
1:C:351:ILE:HG13	1:C:419:ILE:HD11	1.98	0.44
1:E:469:ARG:HH22	1:E:473:PRO:HA	1.83	0.44
1:G:383:GLU:OE1	1:G:469:ARG:NH2	2.44	0.44
1:G:464:HIS:NE2	1:G:467:MET:HB3	2.32	0.44
1:C:405:ARG:HA	1:C:405:ARG:HD2	1.47	0.44
1:G:448:GLN:OE1	3:E:501:GOL:O3	2.27	0.44
1:F:464:HIS:CE1	1:F:467:MET:HB3	2.53	0.43
1:B:395:HIS:ND1	4:B:501:HOH:O	2.28	0.43
1:C:383:GLU:O	1:A:446:THR:HG21	2.19	0.43
1:D:437:TYR:CZ	1:D:445:ARG:HB2	2.53	0.43
1:F:352:LYS:HE3	1:F:356:GLN:HE21	1.83	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:346:ARG:HH21	1:E:346:ARG:HA	1.84	0.43
1:E:361:ILE:HD13	1:E:399:PHE:CZ	2.53	0.43
1:D:469:ARG:HH22	1:D:473:PRO:HA	1.83	0.42
1:F:383:GLU:CD	1:F:469:ARG:HH22	2.28	0.42
1:B:397:PHE:CE2	1:D:444:PRO:HB3	2.54	0.42
1:G:412:ASN:HD21	1:G:433:ARG:HH21	1.66	0.42
1:D:356:GLN:O	1:D:359:GLU:HG2	2.20	0.42
1:A:424:ASP:O	1:A:457:ARG:NH1	2.53	0.41
1:B:389:VAL:HG11	1:B:394:PHE:CB	2.51	0.41
1:G:414:MET:HG3	1:G:431:TYR:CD1	2.56	0.41
1:C:456:HIS:CG	1:D:422:MET:HG2	2.56	0.41
1:G:393:ASP:HA	1:G:396:ARG:HH11	1.86	0.41
1:C:365:ASP:OD1	1:C:365:ASP:C	2.63	0.41
1:D:383:GLU:HB3	1:D:398:TYR:OH	2.21	0.41
1:C:352:LYS:HD3	1:C:352:LYS:HA	1.89	0.40
1:G:375:PRO:HA	1:G:392:LEU:HD12	2.02	0.40
1:G:416:ASN:N	1:G:417:PRO:HD3	2.36	0.40
1:E:383:GLU:OE1	1:E:383:GLU:N	2.48	0.40
1:F:444:PRO:HB3	1:D:397:PHE:CE2	2.56	0.40
1:E:361:ILE:HD11	1:E:369:TYR:CE1	2.56	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	129/135 (96%)	125 (97%)	4 (3%)	0	100	100
1	B	128/135 (95%)	125 (98%)	3 (2%)	0	100	100
1	C	128/135 (95%)	121 (94%)	5 (4%)	2 (2%)	7	4
1	D	126/135 (93%)	124 (98%)	2 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	E	128/135 (95%)	125 (98%)	3 (2%)	0	100	100
1	F	126/135 (93%)	121 (96%)	5 (4%)	0	100	100
1	G	121/135 (90%)	116 (96%)	5 (4%)	0	100	100
All	All	886/945 (94%)	857 (97%)	27 (3%)	2 (0%)	43	44

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	405	ARG
1	C	365	ASP

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	114/117 (97%)	114 (100%)	0	100	100
1	B	113/117 (97%)	112 (99%)	1 (1%)	70	78
1	C	113/117 (97%)	110 (97%)	3 (3%)	39	45
1	D	113/117 (97%)	112 (99%)	1 (1%)	70	78
1	E	113/117 (97%)	113 (100%)	0	100	100
1	F	111/117 (95%)	111 (100%)	0	100	100
1	G	108/117 (92%)	106 (98%)	2 (2%)	50	58
All	All	785/819 (96%)	778 (99%)	7 (1%)	70	78

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

Mol	Chain	Res	Type
1	B	424	ASP
1	C	362	SER
1	C	402	LEU
1	C	405	ARG
1	G	396	ARG

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Mol	Chain	Res	Type
1	G	465	VAL
1	D	424	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	F	355	GLN
1	F	356	GLN
1	F	395	HIS
1	B	387	ASN
1	C	418	HIS
1	G	401	ASN
1	G	412	ASN
1	E	363	ASN
1	E	395	HIS
1	E	448	GLN
1	A	418	HIS
1	D	401	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 8 ligands modelled in this entry, 5 are monoatomic - leaving 3 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
3	GOL	A	501	-	5,5,5	0.95	0	5,5,5	1.03	0
3	GOL	E	501	-	5,5,5	0.97	0	5,5,5	1.04	0
3	GOL	C	501	-	5,5,5	0.95	0	5,5,5	0.97	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
3	GOL	A	501	-	-	2/4/4/4	-
3	GOL	E	501	-	-	0/4/4/4	-
3	GOL	C	501	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	501	GOL	O1-C1-C2-O2
3	C	501	GOL	O1-C1-C2-C3
3	A	501	GOL	C1-C2-C3-O3
3	A	501	GOL	O2-C2-C3-O3

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	E	501	GOL	2	0
3	C	501	GOL	2	0

5.7 Other polymers [\(i\)](#)

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	131/135 (97%)	0.94	16 (12%) 8 8	34, 59, 106, 118	0
1	B	130/135 (96%)	0.86	8 (6%) 26 28	36, 60, 98, 116	0
1	C	130/135 (96%)	1.11	21 (16%) 4 4	40, 66, 101, 124	0
1	D	130/135 (96%)	0.93	17 (13%) 7 7	40, 63, 97, 121	0
1	E	130/135 (96%)	0.89	14 (10%) 11 11	38, 59, 100, 109	0
1	F	128/135 (94%)	0.85	15 (11%) 9 9	36, 57, 93, 120	0
1	G	125/135 (92%)	1.38	27 (21%) 2 2	47, 77, 104, 112	0
All	All	904/945 (95%)	0.99	118 (13%) 7 7	34, 62, 102, 124	0

All (118) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	403	TRP	4.0
1	D	403	TRP	3.9
1	G	399	PHE	3.9
1	G	409	PRO	3.8
1	E	475	VAL	3.7
1	B	402	LEU	3.7
1	G	402	LEU	3.7
1	D	409	PRO	3.7
1	D	364	GLY	3.6
1	B	472	ALA	3.6
1	G	438	LEU	3.6
1	D	399	PHE	3.5
1	C	410	VAL	3.4
1	G	472	ALA	3.4
1	C	403	TRP	3.3
1	A	409	PRO	3.3
1	C	404	SER	3.3

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Mol	Chain	Res	Type	RSRZ
1	B	442	GLY	3.3
1	F	473	PRO	3.2
1	G	443	ILE	3.2
1	E	358	ILE	3.1
1	D	404	SER	3.1
1	E	441	GLY	3.1
1	F	403	TRP	3.0
1	C	345	VAL	3.0
1	D	472	ALA	3.0
1	A	438	LEU	3.0
1	F	472	ALA	2.9
1	D	392	LEU	2.9
1	G	410	VAL	2.9
1	A	441	GLY	2.9
1	C	409	PRO	2.9
1	A	399	PHE	2.9
1	F	409	PRO	2.8
1	D	410	VAL	2.8
1	F	402	LEU	2.8
1	E	409	PRO	2.8
1	A	410	VAL	2.8
1	D	443	ILE	2.8
1	E	440	ALA	2.7
1	D	438	LEU	2.7
1	E	443	ILE	2.7
1	A	403	TRP	2.7
1	F	441	GLY	2.7
1	C	366	PHE	2.7
1	E	472	ALA	2.7
1	F	410	VAL	2.7
1	B	408	LYS	2.7
1	C	402	LEU	2.6
1	F	444	PRO	2.6
1	G	358	ILE	2.6
1	G	392	LEU	2.6
1	B	407	SER	2.6
1	E	460	GLY	2.6
1	G	411	HIS	2.6
1	B	409	PRO	2.6
1	F	404	SER	2.6
1	A	366	PHE	2.5
1	A	402	LEU	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	397	PHE	2.5
1	G	442	GLY	2.5
1	C	443	ILE	2.5
1	E	410	VAL	2.5
1	A	443	ILE	2.5
1	C	369	TYR	2.5
1	G	427	ALA	2.5
1	G	364	GLY	2.5
1	A	404	SER	2.4
1	D	440	ALA	2.4
1	G	414	MET	2.4
1	C	370	THR	2.4
1	G	346	ARG	2.4
1	G	440	ALA	2.3
1	A	406	ASN	2.3
1	D	402	LEU	2.3
1	C	460	GLY	2.3
1	A	405	ARG	2.3
1	B	403	TRP	2.3
1	G	462	TRP	2.3
1	G	460	GLY	2.3
1	E	408	LYS	2.3
1	E	474	SER	2.3
1	A	407	SER	2.3
1	G	366	PHE	2.2
1	E	444	PRO	2.2
1	C	392	LEU	2.2
1	C	462	TRP	2.2
1	F	442	GLY	2.2
1	A	364	GLY	2.2
1	G	421	LEU	2.2
1	C	343	HIS	2.2
1	C	398	TYR	2.2
1	C	446	THR	2.2
1	G	351	ILE	2.2
1	G	397	PHE	2.2
1	E	438	LEU	2.2
1	C	393	ASP	2.1
1	F	440	ALA	2.1
1	C	360	ALA	2.1
1	G	360	ALA	2.1
1	F	397	PHE	2.1

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Mol	Chain	Res	Type	RSRZ
1	C	399	PHE	2.1
1	C	440	ALA	2.1
1	G	368	SER	2.1
1	D	401	ASN	2.1
1	D	395	HIS	2.1
1	B	471	GLY	2.1
1	E	395	HIS	2.0
1	C	423	GLY	2.0
1	G	437	TYR	2.0
1	D	474	SER	2.0
1	F	392	LEU	2.0
1	G	415	LEU	2.0
1	A	411	HIS	2.0
1	F	471	GLY	2.0
1	D	460	GLY	2.0
1	F	398	TYR	2.0
1	D	398	TYR	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	GOL	C	501	6/6	0.70	0.17	51,62,63,66	6
3	GOL	E	501	6/6	0.74	0.18	39,54,56,64	6
3	GOL	A	501	6/6	0.89	0.12	39,46,49,49	6
2	K	F	502	1/1	0.90	0.30	82,82,82,82	0
2	K	D	501	1/1	0.91	0.09	72,72,72,72	0
2	K	A	502	1/1	0.91	0.09	69,69,69,69	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	K	E	502	1/1	0.95	0.08	56,56,56,56	0
2	K	F	501	1/1	0.96	0.10	56,56,56,56	0

6.5 Other polymers [i](#)

There are no such residues in this entry.