



# Full wwPDB X-ray Structure Validation Report ⓘ

May 15, 2020 – 09:09 pm BST

PDB ID : 6OF8  
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](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

---

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

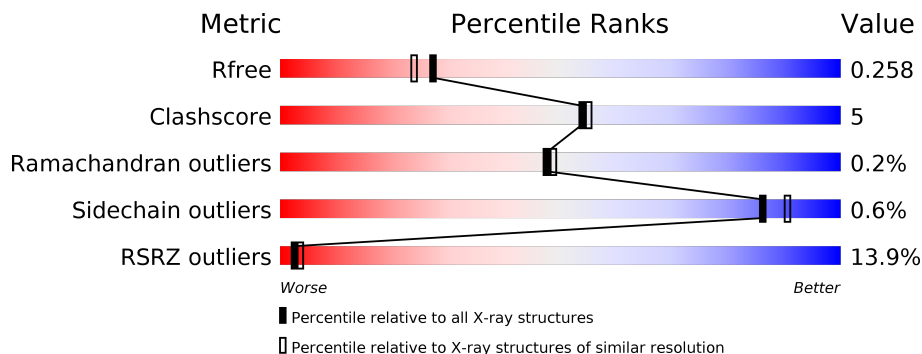
MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.11  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.11

# 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.



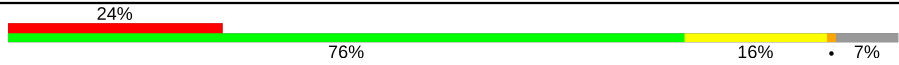
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	135	
1	B	135	
1	C	135	
1	D	135	
1	E	135	
1	F	135	

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Length	Quality of chain
1	G	135	 <p>A horizontal bar chart showing the quality of chain. The bar is divided into four segments: a red segment (24%), a green segment (76%), a yellow segment (16%), and a grey segment (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

*Continued on next page...*

*Continued from previous page...*

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

*Continued on next page...*

*Continued from previous page...*

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 (three-letter code: K) (formula: K).

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

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



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

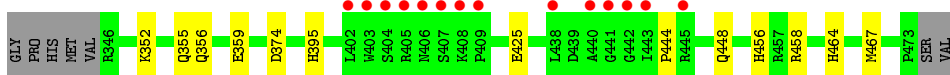
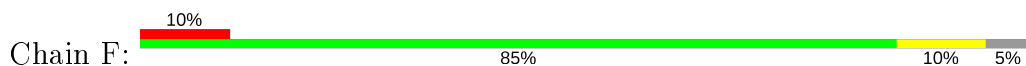
- Molecule 4 is water.

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

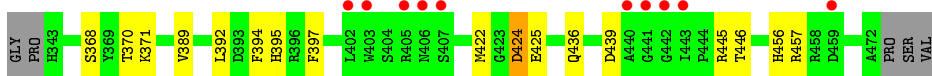
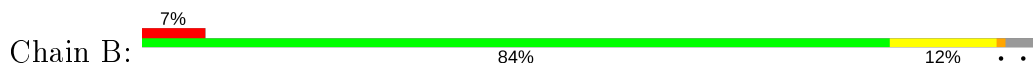
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

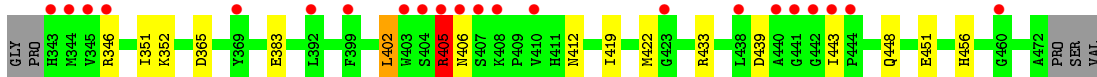
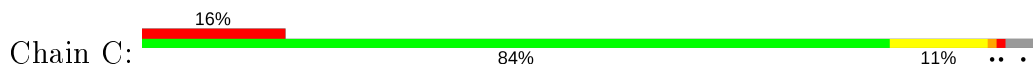
- Molecule 1: Calcium/calmodulin-dependent protein kinase type II subunit alpha



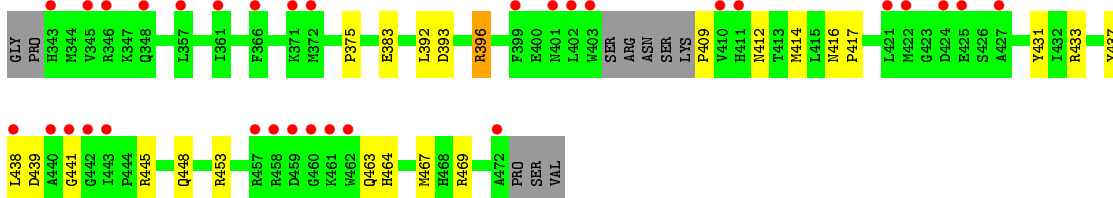
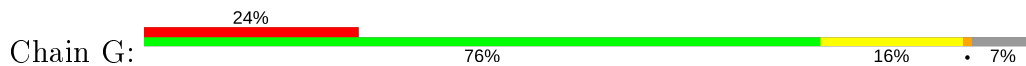
- Molecule 1: Calcium/calmodulin-dependent protein kinase type II subunit alpha



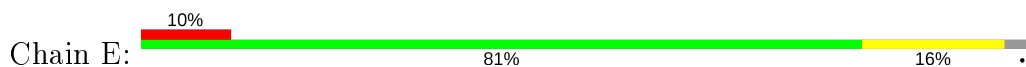
- Molecule 1: Calcium/calmodulin-dependent protein kinase type II subunit alpha



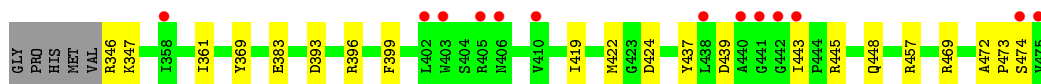
- Molecule 1: Calcium/calmodulin-dependent protein kinase type II subunit alpha



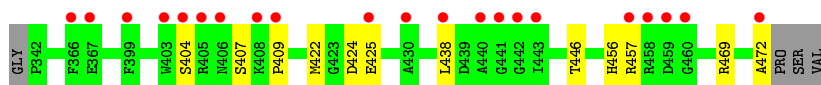
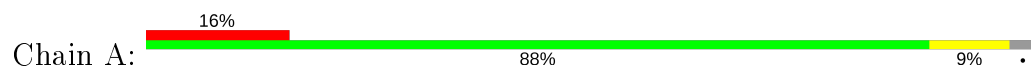
- Molecule 1: Calcium/calmodulin-dependent protein kinase type II subunit alpha



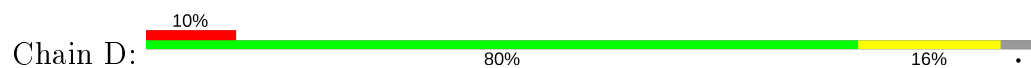




- Molecule 1: Calcium/calmodulin-dependent protein kinase type II subunit alpha



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



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	162.99Å 121.34Å 56.24Å 90.00° 108.15° 90.00°	Depositor
Resolution (Å)	47.51 – 2.10 47.76 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.6 (47.51-2.10) 99.6 (47.76-2.10)	Depositor EDS
$R_{merge}$	0.04	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.58 (at 2.10Å)	Xtrriage
Refinement program	PHENIX (1.14_3260: ???)	Depositor
R, $R_{free}$	0.222 , 0.258 0.221 , 0.258	Depositor DCC
$R_{free}$ test set	3074 reflections (5.10%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	49.0	Xtrriage
Anisotropy	0.202	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 61.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	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 <sup>2</sup> )	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.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, K

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	0.25	0/1096	0.42	0/1480
1	B	0.25	0/1088	0.42	0/1469
1	C	0.25	0/1088	0.43	0/1469
1	D	0.25	0/1082	0.42	0/1461
1	E	0.25	0/1083	0.42	0/1464
1	F	0.25	0/1070	0.42	0/1446
1	G	0.24	0/1047	0.41	0/1413
All	All	0.25	0/7554	0.42	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	13	0
1	D	1054	0	1005	14	0
1	E	1055	0	1009	14	0
1	F	1042	0	995	9	0

*Continued on next page...*

Continued from previous page...

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	77	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 (77) 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:OE2	1:B:425:GLU:N	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

Continued on next page...

*Continued from previous page...*

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:E:347:LYS:HB3	1:E:419:ILE:HD12	1.95	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:B:389:VAL:HG11	1:B:394:PHE:HB2	1.97	0.47
1:F:355:GLN:O	1:F:359:GLU:HG2	2.14	0.47
1:A:409:PRO:HD2	1:A:438:LEU:HD12	1.97	0.46
1:F:425:GLU:OE1	1:F:425:GLU:N	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:G:439:ASP:C	1:G:441:GLY:H	2.20	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:C:433:ARG:HE	1:C:451:GLU:CD	2.20	0.45
1:G:463:GLN:NE2	4:G:502:HOH:O	2.49	0.45
1:A:469:ARG:HH12	1:A:472:ALA:C	2.21	0.44
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:HD2	1:C:405:ARG:HA	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:E:346:ARG:HH21	1:E:346:ARG:HA	1.84	0.43

*Continued on next page...*

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:361:ILE:HD13	1:E:399:PHE:CZ	2.53	0.43
1:F:352:LYS:HE3	1:F:356:GLN:HE21	1.83	0.43
1:D:469:ARG:HH22	1:D:473:PRO:HA	1.83	0.42
1:B:397:PHE:CE2	1:D:444:PRO:HB3	2.54	0.42
1:D:356:GLN:O	1:D:359:GLU:HG2	2.20	0.42
1:G:412:ASN:HD21	1:G:433:ARG:HH21	1.66	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: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:E:383:GLU:N	1:E:383:GLU:OE1	2.48	0.40
1:G:416:ASN:N	1:G:417:PRO:HD3	2.36	0.40
1:E:361:ILE:HD11	1:E:369:TYR:CE1	2.56	0.40
1:F:444:PRO:HB3	1:D:397:PHE:CE2	2.56	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	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%)	9	5
1	D	126/135 (93%)	124 (98%)	2 (2%)	0	100	100
1	E	128/135 (95%)	125 (98%)	3 (2%)	0	100	100
1	F	126/135 (93%)	121 (96%)	5 (4%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	G	121/135 (90%)	116 (96%)	5 (4%)	0	100	100
All	All	886/945 (94%)	857 (97%)	27 (3%)	2 (0%)	47	49

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%)	78	84
1	C	113/117 (97%)	111 (98%)	2 (2%)	59	65
1	D	113/117 (97%)	112 (99%)	1 (1%)	78	84
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%)	107 (99%)	1 (1%)	78	84
All	All	785/819 (96%)	780 (99%)	5 (1%)	86	90

All (5) residues with a non-rotameric sidechain are listed below:

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

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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 carbohydrates 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	E	501	-	5,5,5	0.94	0	5,5,5	0.96	0
3	GOL	A	501	-	5,5,5	0.92	0	5,5,5	0.95	0
3	GOL	C	501	-	5,5,5	0.92	0	5,5,5	0.90	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	E	501	-	-	0/4/4/4	-
3	GOL	A	501	-	-	2/4/4/4	-
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 [i](#)

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, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	131/135 (97%)	1.06	21 (16%) <b>1</b> <b>2</b>	34, 59, 106, 118	0
1	B	130/135 (96%)	0.70	10 (7%) <b>13</b> <b>17</b>	36, 60, 98, 116	0
1	C	130/135 (96%)	1.00	22 (16%) <b>1</b> <b>2</b>	40, 66, 101, 124	0
1	D	130/135 (96%)	0.67	14 (10%) <b>5</b> <b>7</b>	40, 63, 97, 121	0
1	E	130/135 (96%)	0.85	13 (10%) <b>7</b> <b>9</b>	38, 59, 100, 109	0
1	F	128/135 (94%)	0.86	14 (10%) <b>5</b> <b>7</b>	36, 57, 93, 120	0
1	G	125/135 (92%)	1.27	32 (25%) <b>0</b> <b>0</b>	47, 77, 104, 112	0
All	All	904/945 (95%)	0.91	126 (13%) <b>2</b> <b>3</b>	34, 62, 102, 124	0

All (126) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	475	VAL	10.0
1	C	403	TRP	8.3
1	A	405	ARG	5.9
1	F	440	ALA	5.9
1	D	403	TRP	5.9
1	A	406	ASN	5.8
1	E	474	SER	5.8
1	B	440	ALA	5.5
1	A	441	GLY	5.5
1	B	402	LEU	5.3
1	G	402	LEU	5.3
1	A	438	LEU	5.2
1	A	440	ALA	5.2
1	D	440	ALA	5.2
1	A	404	SER	5.2
1	F	443	ILE	5.2
1	C	440	ALA	5.0

*Continued on next page...*

*Continued from previous page...*

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	E	405	ARG	5.0
1	G	443	ILE	5.0
1	A	443	ILE	4.9
1	D	473	PRO	4.8
1	C	443	ILE	4.7
1	F	405	ARG	4.6
1	B	442	GLY	4.6
1	F	406	ASN	4.5
1	G	399	PHE	4.5
1	F	402	LEU	4.5
1	D	407	SER	4.5
1	C	410	VAL	4.4
1	C	405	ARG	4.4
1	G	459	ASP	4.4
1	D	443	ILE	4.4
1	G	440	ALA	4.4
1	G	457	ARG	4.4
1	G	425	GLU	4.3
1	C	407	SER	4.2
1	A	403	TRP	4.1
1	G	403	TRP	4.1
1	F	442	GLY	4.1
1	D	399	PHE	4.1
1	G	438	LEU	4.1
1	E	443	ILE	4.1
1	G	461	LYS	4.0
1	E	440	ALA	3.9
1	E	441	GLY	3.9
1	A	442	GLY	3.9
1	C	442	GLY	3.8
1	G	460	GLY	3.7
1	G	458	ARG	3.7
1	F	403	TRP	3.7
1	C	406	ASN	3.7
1	B	407	SER	3.6
1	F	441	GLY	3.6
1	C	344	MET	3.6
1	D	408	LYS	3.5
1	C	345	VAL	3.5
1	C	392	LEU	3.5
1	E	438	LEU	3.5
1	B	443	ILE	3.4

*Continued on next page...*

*Continued from previous page...*

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	F	408	LYS	3.4
1	C	404	SER	3.4
1	E	402	LEU	3.3
1	E	442	GLY	3.3
1	G	427	ALA	3.2
1	B	441	GLY	3.2
1	D	460	GLY	3.1
1	G	366	PHE	3.1
1	D	404	SER	3.1
1	G	346	ARG	3.1
1	D	442	GLY	3.0
1	G	410	VAL	3.0
1	A	408	LYS	3.0
1	A	459	ASP	3.0
1	G	462	TRP	2.9
1	G	441	GLY	2.9
1	D	438	LEU	2.9
1	A	399	PHE	2.9
1	G	442	GLY	2.9
1	G	421	LEU	2.9
1	G	424	ASP	2.8
1	F	409	PRO	2.8
1	C	399	PHE	2.7
1	E	410	VAL	2.7
1	G	343	HIS	2.7
1	A	367	GLU	2.6
1	A	460	GLY	2.6
1	B	403	TRP	2.6
1	G	422	MET	2.6
1	F	404	SER	2.6
1	C	343	HIS	2.5
1	A	425	GLU	2.5
1	C	460	GLY	2.4
1	G	361	ILE	2.4
1	C	423	GLY	2.4
1	G	411	HIS	2.4
1	G	371	LYS	2.4
1	C	369	TYR	2.4
1	C	444	PRO	2.3
1	G	372	MET	2.3
1	E	406	ASN	2.3
1	D	459	ASP	2.3

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	G	401	ASN	2.3
1	B	405	ARG	2.3
1	A	458	ARG	2.2
1	A	472	ALA	2.2
1	A	409	PRO	2.2
1	D	472	ALA	2.2
1	F	407	SER	2.2
1	B	459	ASP	2.2
1	D	410	VAL	2.2
1	C	438	LEU	2.1
1	E	403	TRP	2.1
1	G	345	VAL	2.1
1	E	358	ILE	2.1
1	F	438	LEU	2.1
1	G	357	LEU	2.1
1	B	406	ASN	2.1
1	C	346	ARG	2.1
1	G	348	GLN	2.1
1	C	408	LYS	2.0
1	G	472	ALA	2.0
1	A	366	PHE	2.0
1	A	457	ARG	2.0
1	A	430	ALA	2.0
1	F	445	ARG	2.0
1	C	441	GLY	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 carbohydrates 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, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	GOL	E	501	6/6	0.76	0.20	39,54,56,64	6
3	GOL	C	501	6/6	0.79	0.16	51,62,63,66	6
2	K	F	502	1/1	0.82	0.24	82,82,82,82	0
3	GOL	A	501	6/6	0.85	0.16	39,46,49,49	6
2	K	A	502	1/1	0.90	0.06	69,69,69,69	0
2	K	D	501	1/1	0.95	0.05	72,72,72,72	0
2	K	F	501	1/1	0.97	0.09	56,56,56,56	0
2	K	E	502	1/1	0.97	0.11	56,56,56,56	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.