



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 5, 2026 – 03:53 PM UTC

PDB ID : 3SS5 / pdb_00003ss5
Title : Crystal structure of mouse Glutaminase C, L-glutamate-bound form
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Deposited on : 2011-07-07
Resolution : 2.80 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
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

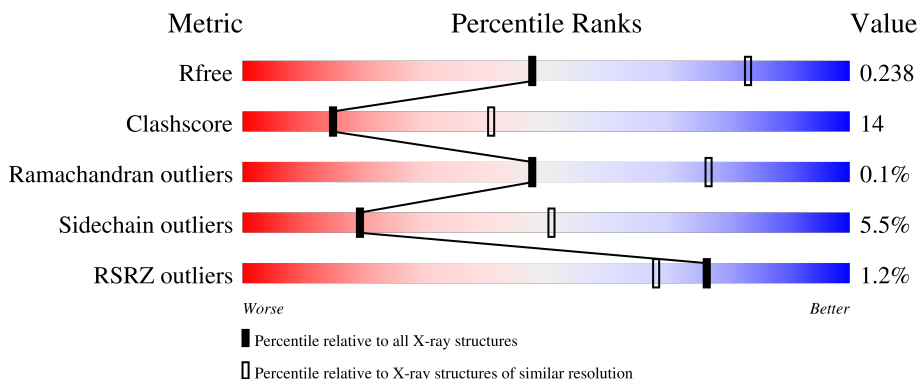
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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	3866 (2.80-2.80)
Clashscore	190562	4276 (2.80-2.80)
Ramachandran outliers	187476	4196 (2.80-2.80)
Sidechain outliers	187428	4198 (2.80-2.80)
RSRZ outliers	180081	3869 (2.80-2.80)

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	479	57% 24% • 18%
1	B	479	52% 27% • 19%
1	C	479	56% 24% • 17%
1	D	479	54% 27% • 18%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 12542 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.

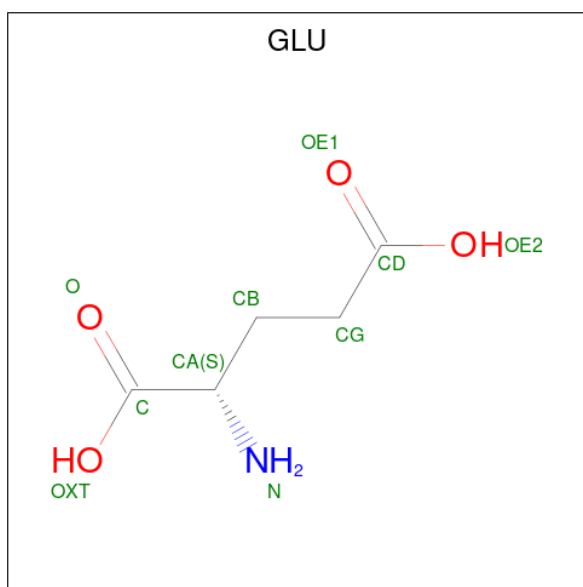
- Molecule 1 is a protein called Glutaminase C.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	394	Total	C	N	O	S	1	0	0
			3080	1968	519	565	28			
1	B	390	Total	C	N	O	S	1	0	0
			3052	1951	514	559	28			
1	C	396	Total	C	N	O	S	1	0	0
			3096	1977	521	570	28			
1	D	391	Total	C	N	O	S	1	0	0
			3060	1957	515	560	28			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	125	GLY	-	expression tag	UNP Q69ZX9
A	126	SER	-	expression tag	UNP Q69ZX9
A	127	HIS	-	expression tag	UNP Q69ZX9
B	125	GLY	-	expression tag	UNP Q69ZX9
B	126	SER	-	expression tag	UNP Q69ZX9
B	127	HIS	-	expression tag	UNP Q69ZX9
C	125	GLY	-	expression tag	UNP Q69ZX9
C	126	SER	-	expression tag	UNP Q69ZX9
C	127	HIS	-	expression tag	UNP Q69ZX9
D	125	GLY	-	expression tag	UNP Q69ZX9
D	126	SER	-	expression tag	UNP Q69ZX9
D	127	HIS	-	expression tag	UNP Q69ZX9

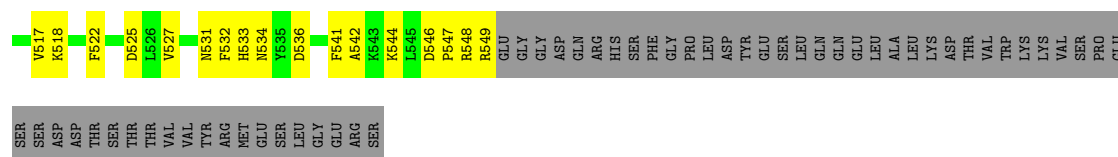
- Molecule 2 is GLUTAMIC ACID (CCD ID: GLU) (formula: C₅H₉NO₄).



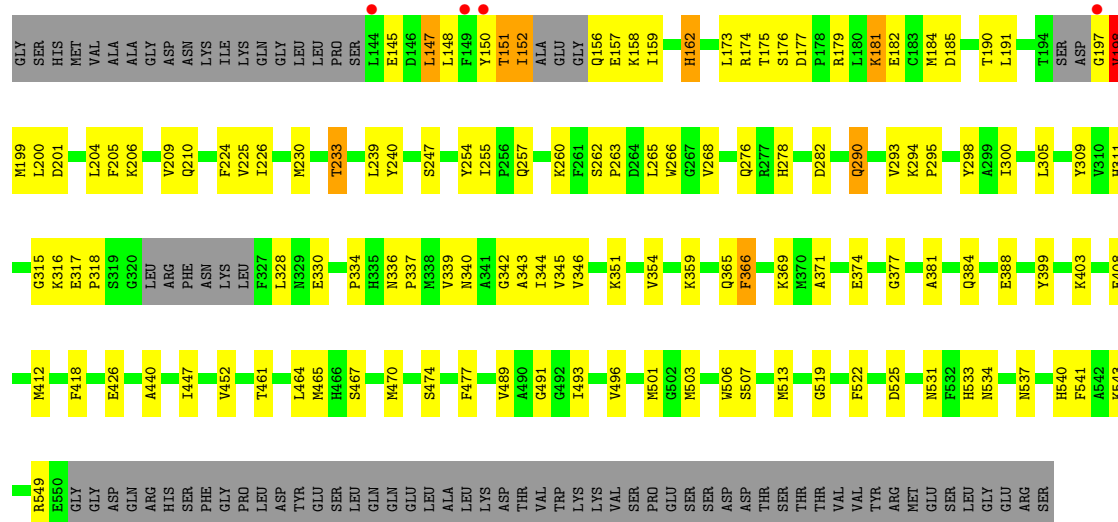
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			10	5	1	4		
2	B	1	Total	C	N	O	0	0
			10	5	1	4		
2	C	1	Total	C	N	O	0	0
			10	5	1	4		
2	D	1	Total	C	N	O	0	0
			10	5	1	4		

- Molecule 3 is water.

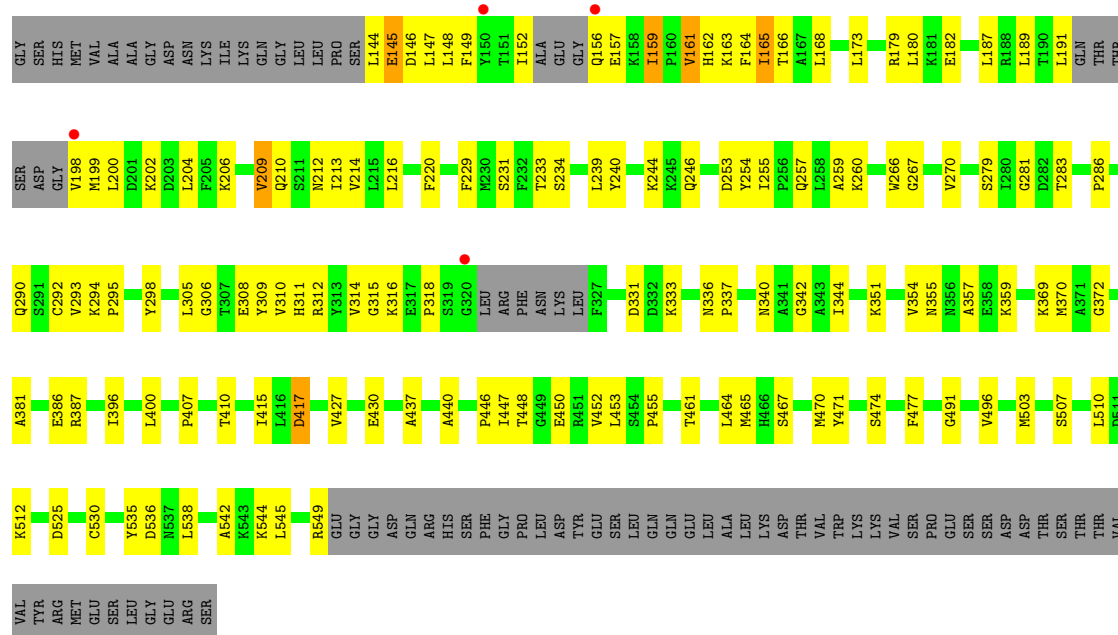
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	65	Total	O	0	0
			65	65		
3	B	56	Total	O	0	0
			56	56		
3	C	43	Total	O	0	0
			43	43		
3	D	50	Total	O	0	0
			50	50		



• Molecule 1: Glutaminase C



• Molecule 1: Glutaminase C



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	50.38Å 139.43Å 178.39Å 90.00° 93.77° 90.00°	Depositor
Resolution (Å)	19.98 – 2.80 19.98 – 2.80	Depositor EDS
% Data completeness (in resolution range)	98.9 (19.98-2.80) 98.5 (19.98-2.80)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	0.11	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.08 (at 2.81Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.1_743)	Depositor
R, R_{free}	0.206 , 0.240 0.203 , 0.238	Depositor DCC
R_{free} test set	3020 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	43.1	Xtriage
Anisotropy	0.819	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 41.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	12542	wwPDB-VP
Average B, all atoms (Å ²)	45.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.03% 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

5.1 Standard geometry

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	0.29	0/3147	0.73	1/4244 (0.0%)
1	B	0.29	0/3119	0.74	1/4206 (0.0%)
1	C	0.29	0/3163	0.73	2/4266 (0.0%)
1	D	0.30	0/3127	0.74	1/4217 (0.0%)
All	All	0.29	0/12556	0.73	5/16933 (0.0%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	542	ALA	CB-CA-C	-5.49	110.26	116.63
1	D	542	ALA	CB-CA-C	-5.34	110.44	116.63
1	C	290	GLN	CB-CA-C	-5.20	110.59	116.63
1	C	159	ILE	N-CA-C	5.10	113.55	107.73
1	A	542	ALA	CB-CA-C	-5.00	110.42	117.23

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	3080	0	3062	80	0
1	B	3052	0	3033	100	0
1	C	3096	0	3075	77	0
1	D	3060	0	3044	88	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	10	0	8	0	0
2	B	10	0	8	1	0
2	C	10	0	8	0	0
2	D	10	0	8	0	0
3	A	65	0	0	2	0
3	B	56	0	0	5	0
3	C	43	0	0	1	0
3	D	50	0	0	1	0
All	All	12542	0	12246	340	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 14.

The worst 5 of 340 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:C:156:GLN:HG2	1:C:157:GLU:H	1.27	0.94
1:B:221:ARG:HD3	1:B:223:LYS:HD3	1.56	0.83
1:D:145:GLU:HG3	1:D:206:LYS:HG3	1.61	0.83
1:A:266:TRP:HB2	1:A:518:LYS:HE3	1.61	0.81
1:D:270:VAL:HG22	1:D:503:MET:HE2	1.62	0.80

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	386/479 (81%)	378 (98%)	8 (2%)	0	100	100
1	B	382/479 (80%)	369 (97%)	13 (3%)	0	100	100
1	C	388/479 (81%)	378 (97%)	9 (2%)	1 (0%)	36	66

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	D	383/479 (80%)	375 (98%)	8 (2%)	0	100	100
All	All	1539/1916 (80%)	1500 (98%)	38 (2%)	1 (0%)	48	77

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	198	VAL

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	342/415 (82%)	322 (94%)	20 (6%)	18	49
1	B	339/415 (82%)	317 (94%)	22 (6%)	15	43
1	C	344/415 (83%)	323 (94%)	21 (6%)	17	46
1	D	340/415 (82%)	328 (96%)	12 (4%)	32	67
All	All	1365/1660 (82%)	1290 (94%)	75 (6%)	19	51

5 of 75 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	365	GLN
1	D	246	GLN
1	C	408	GLU
1	D	159	ILE
1	B	156	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	235	HIS
1	D	373	ASN
1	D	521	HIS

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Mol	Chain	Res	Type
1	C	156	GLN
1	C	355	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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

4 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	$\# Z > 2$
2	GLU	D	1	-	8,9,9	1.10	1 (12%)	8,11,11	1.15	1 (12%)
2	GLU	C	1	-	8,9,9	1.09	1 (12%)	8,11,11	1.16	1 (12%)
2	GLU	A	1	-	8,9,9	1.08	1 (12%)	8,11,11	1.17	1 (12%)
2	GLU	B	1	-	8,9,9	1.08	1 (12%)	8,11,11	1.17	1 (12%)

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	GLU	D	1	-	-	0/9/9/9	-
2	GLU	C	1	-	-	2/9/9/9	-
2	GLU	A	1	-	-	2/9/9/9	-
2	GLU	B	1	-	-	0/9/9/9	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	1	GLU	OXT-C	-2.22	1.23	1.30
2	A	1	GLU	OXT-C	-2.22	1.23	1.30
2	C	1	GLU	OXT-C	-2.21	1.23	1.30
2	B	1	GLU	OXT-C	-2.20	1.23	1.30

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1	GLU	OXT-C-O	-2.62	118.14	124.08
2	A	1	GLU	OXT-C-O	-2.62	118.14	124.08
2	D	1	GLU	OXT-C-O	-2.60	118.18	124.08
2	B	1	GLU	OXT-C-O	-2.59	118.20	124.08

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	1	GLU	OE1-CD-CG-CB
2	C	1	GLU	OE2-CD-CG-CB
2	A	1	GLU	OXT-C-CA-N
2	A	1	GLU	OE1-CD-CG-CB

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	1	GLU	1	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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	394/479 (82%)	-0.23	7 (1%) 67 58	28, 39, 71, 90	1 (0%)
1	B	390/479 (81%)	-0.19	4 (1%) 79 72	27, 41, 72, 94	1 (0%)
1	C	396/479 (82%)	-0.18	4 (1%) 79 72	31, 43, 72, 93	1 (0%)
1	D	391/479 (81%)	-0.19	4 (1%) 79 72	31, 43, 71, 90	1 (0%)
All	All	1571/1916 (81%)	-0.20	19 (1%) 76 68	27, 42, 72, 94	4 (0%)

The worst 5 of 19 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	197	GLY	3.4
1	C	144	LEU	3.3
1	A	155	GLY	3.3
1	B	144	LEU	3.0
1	C	149	PHE	2.8

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($\text{\AA}^2$)	Q<0.9
2	GLU	A	1	10/10	0.93	0.09	41,44,49,50	0
2	GLU	C	1	10/10	0.93	0.08	41,51,55,56	0
2	GLU	D	1	10/10	0.93	0.09	42,52,57,63	0
2	GLU	B	1	10/10	0.94	0.10	41,50,55,59	0

6.5 Other polymers [i](#)

There are no such residues in this entry.