



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 5, 2026 – 09:41 AM UTC

PDB ID : 6OBD / pdb_00006obd
Title : Crystal structure of anti-GLD52 Fab complex with human GLD52 peptide mimetic
Authors : Wei, R.
Deposited on : 2019-03-20
Resolution : 2.20 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

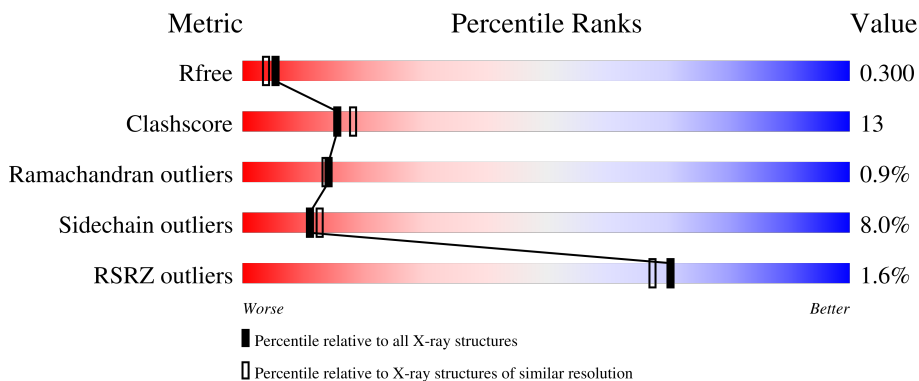
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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	6164 (2.20-2.20)
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)
RSRZ outliers	180081	6166 (2.20-2.20)

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	216	<div style="display: flex; align-items: center;"> <div style="width: 10px; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 100%; height: 20px; background: linear-gradient(to right, red 1%, green 80%, yellow 86%, orange 92%, grey 95%);"></div> <div style="margin-left: 5px;">%</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> 80% 16% . </div>
1	L	216	<div style="display: flex; align-items: center;"> <div style="width: 10px; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 100%; height: 20px; background: linear-gradient(to right, red 1%, green 74%, yellow 80%, orange 86%, grey 92%);"></div> <div style="margin-left: 5px;">%</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> 74% 24% .. </div>
2	B	216	<div style="display: flex; align-items: center;"> <div style="width: 10px; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 100%; height: 20px; background: linear-gradient(to right, red 1%, green 76%, yellow 83%, orange 89%, grey 94%);"></div> <div style="margin-left: 5px;">%</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> 76% 17% 5% . </div>
2	H	216	<div style="display: flex; align-items: center;"> <div style="width: 10px; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 100%; height: 20px; background: linear-gradient(to right, red 3%, green 72%, yellow 79%, orange 85%, grey 91%);"></div> <div style="margin-left: 5px;">3%</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> 72% 23% ... </div>
3	E	10	<div style="display: flex; align-items: center;"> <div style="width: 100%; height: 20px; background: linear-gradient(to right, green 30%, yellow 60%, grey 90%);"></div> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> 30% 60% 10% </div>

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Mol	Chain	Length	Quality of chain
3	F	10	A horizontal bar chart showing the quality of chain for Mol 3, Chain F, Length 10. The bar is divided into four segments: red (0-20%), green (20-30%), yellow (30-40%), and orange (40-100%).

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
5	OPE	F	101	-	-	X	-

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 7253 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 anti-GLD52 Fab light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	216	Total 1659	C 1041	N 280	O 333	S 5	0	0	0
1	L	216	Total 1659	C 1042	N 280	O 332	S 5	0	0	0

- Molecule 2 is a protein called anti-GLD52 Fab heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	211	Total 1591	C 1006	N 267	O 312	S 6	0	0	0
2	H	211	Total 1587	C 1003	N 266	O 312	S 6	0	0	0

- Molecule 3 is a protein called GLD52 peptide mimetic.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	E	9	Total 62	C 34	N 10	O 18	0	0	0
3	F	10	Total 70	C 38	N 12	O 20	0	0	0

- Molecule 4 is ZINC ION (CCD ID: ZN) (formula: Zn).

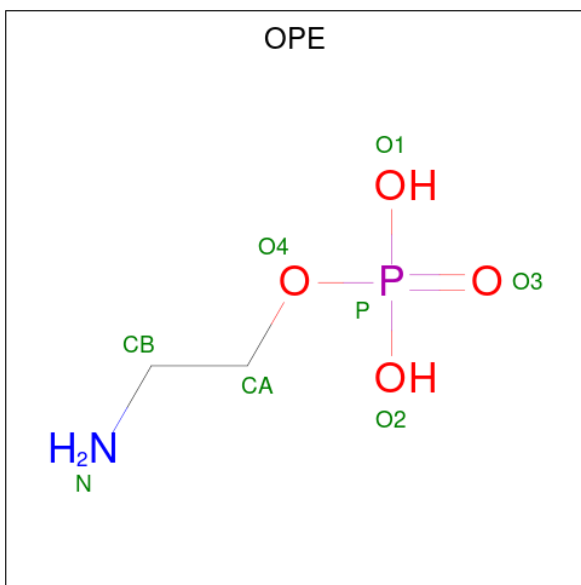
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total 1	Zn 1	0	0
4	B	1	Total 1	Zn 1	0	0
4	L	1	Total 1	Zn 1	0	0
4	H	1	Total 1	Zn 1	0	0

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	E	1	Total	Zn	0	0
			1	1		

- Molecule 5 is PHOSPHORIC ACID MONO-(2-AMINO-ETHYL) ESTER (CCD ID: OPE) (formula: C₂H₈NO₄P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
5	E	1	8	2	1	4	1	0	0
5	F	1	8	2	1	4	1	0	0

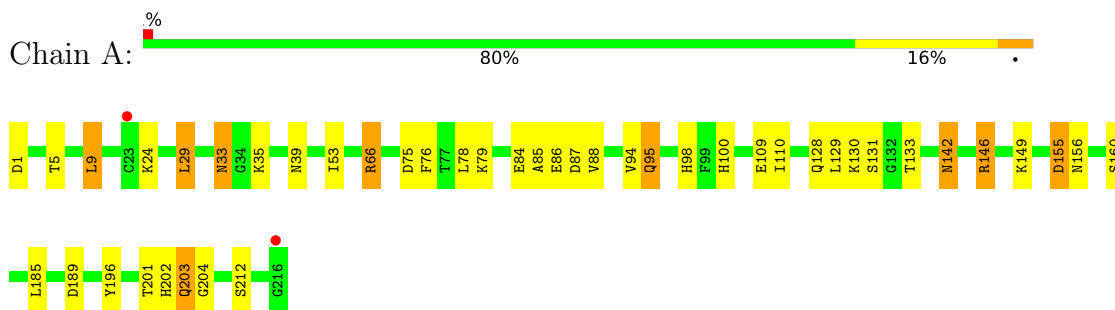
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	166	Total	O	0	0
			166	166		
6	B	169	Total	O	0	0
			169	169		
6	L	130	Total	O	0	0
			130	130		
6	H	123	Total	O	0	0
			123	123		
6	E	6	Total	O	0	0
			6	6		
6	F	10	Total	O	0	0
			10	10		

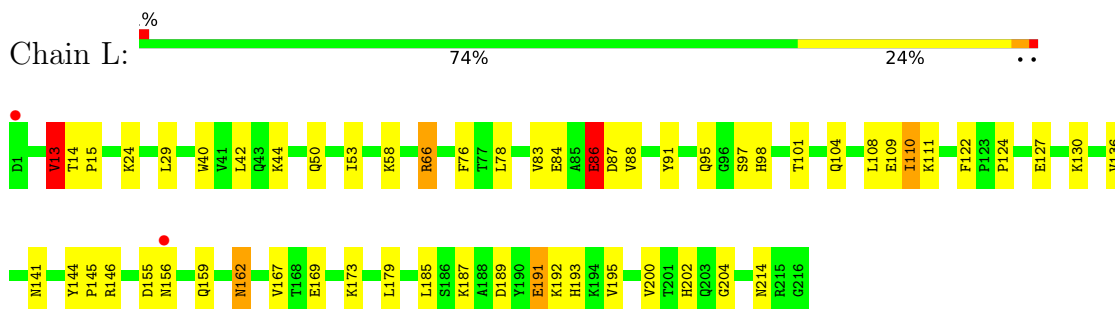
3 Residue-property plots [i](#)

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.

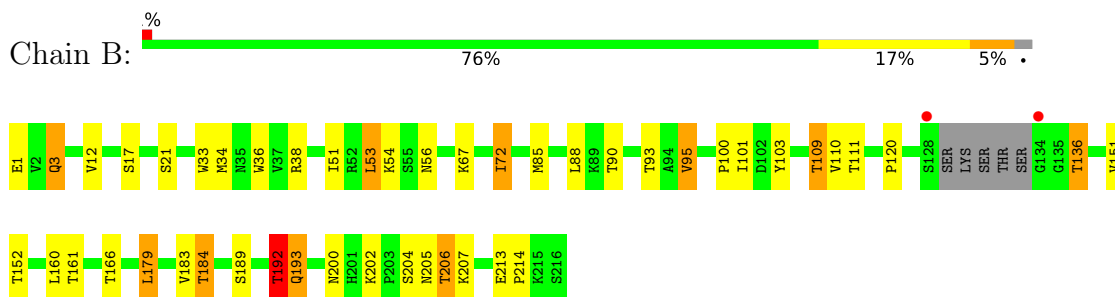
- Molecule 1: anti-GLD52 Fab light chain



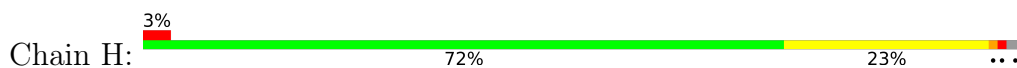
- Molecule 1: anti-GLD52 Fab light chain

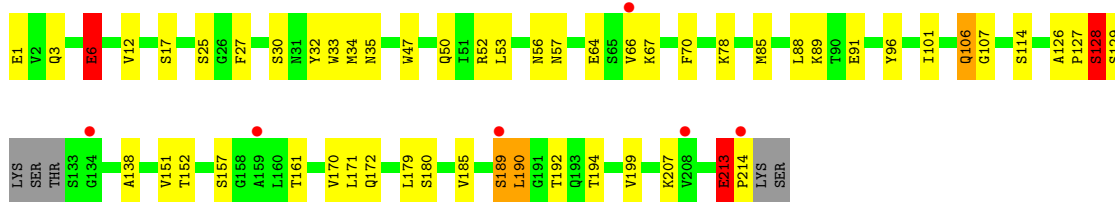


- Molecule 2: anti-GLD52 Fab heavy chain



- Molecule 2: anti-GLD52 Fab heavy chain

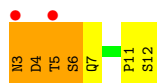
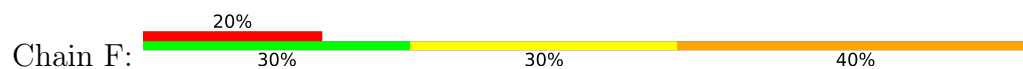




- Molecule 3: GLD52 peptide mimetic



- Molecule 3: GLD52 peptide mimetic



4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	54.40Å 131.20Å 133.80Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.53 – 2.20 30.53 – 2.20	Depositor EDS
% Data completeness (in resolution range)	95.4 (30.53-2.20) 95.4 (30.53-2.20)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.58 (at 2.20Å)	Xtrriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.234 , 0.307 0.230 , 0.300	Depositor DCC
R_{free} test set	2387 reflections (4.82%)	wwPDB-VP
Wilson B-factor (Å ²)	32.8	Xtrriage
Anisotropy	0.191	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 27.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	0.000 for -h,l,k	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	7253	wwPDB-VP
Average B, all atoms (Å ²)	28.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.42% 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: OPE, ZN

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	1.13	1/1694 (0.1%)	1.07	2/2296 (0.1%)
1	L	1.09	2/1694 (0.1%)	1.16	3/2296 (0.1%)
2	B	1.09	3/1631 (0.2%)	1.09	2/2221 (0.1%)
2	H	1.09	0/1627	1.17	5/2218 (0.2%)
3	E	1.23	0/62	1.25	0/84
3	F	1.46	1/70 (1.4%)	1.21	0/95
All	All	1.10	7/6778 (0.1%)	1.13	12/9210 (0.1%)

The worst 5 of 7 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	166	THR	CA-CB	6.53	1.61	1.53
3	F	5	THR	C-O	5.70	1.27	1.23
1	A	5	THR	CA-CB	5.28	1.60	1.53
1	L	122	PHE	CA-C	-5.11	1.48	1.52
2	B	109	THR	CA-CB	5.07	1.60	1.53

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	126	ALA	CA-C-N	7.48	128.15	119.47
2	H	126	ALA	C-N-CA	7.48	128.15	119.47
2	B	192	THR	N-CA-C	-7.04	105.61	114.56
1	L	66	ARG	NE-CZ-NH2	-6.67	113.19	119.20
2	H	6	GLU	CB-CG-CD	-6.48	101.58	112.60

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	1659	0	1629	35	1
1	L	1659	0	1633	51	1
2	B	1591	0	1552	35	0
2	H	1587	0	1544	51	1
3	E	62	0	52	9	0
3	F	70	0	58	14	0
4	A	1	0	0	1	0
4	B	1	0	0	0	0
4	E	1	0	0	0	1
4	H	1	0	0	1	0
4	L	1	0	0	0	0
5	E	8	0	6	3	0
5	F	8	0	6	4	1
6	A	166	0	0	1	0
6	B	169	0	0	2	0
6	E	6	0	0	3	0
6	F	10	0	0	0	0
6	H	123	0	0	5	0
6	L	130	0	0	4	0
All	All	7253	0	6480	176	3

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 13.

The worst 5 of 176 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)
3:F:12:SER:C	5:F:101:OPE:N	1.77	1.42
3:E:12:SER:C	5:E:101:OPE:N	1.85	1.33
1:L:193:HIS:HD2	6:L:502:HOH:O	1.15	1.24
3:F:12:SER:C	5:F:101:OPE:HN2	1.41	1.15
1:A:85:ALA:HA	1:A:110:ILE:HD11	1.26	1.13

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:E:102:ZN:ZN	5:F:101:OPE:O1[2_354]	1.66	0.54
1:L:193:HIS:ND1	2:H:64:GLU:OE2[4_545]	2.00	0.20
1:A:1:ASP:OD1	1:A:189:ASP:OD2[4_455]	2.16	0.04

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	214/216 (99%)	205 (96%)	8 (4%)	1 (0%)	24	27
1	L	214/216 (99%)	203 (95%)	11 (5%)	0	100	100
2	B	207/216 (96%)	201 (97%)	5 (2%)	1 (0%)	24	27
2	H	207/216 (96%)	193 (93%)	10 (5%)	4 (2%)	6	4
3	E	7/10 (70%)	7 (100%)	0	0	100	100
3	F	8/10 (80%)	4 (50%)	2 (25%)	2 (25%)	0	0
All	All	857/884 (97%)	813 (95%)	36 (4%)	8 (1%)	14	14

5 of 8 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	F	4	ASP
3	F	6	SER
1	A	155	ASP
2	H	128	SER
2	H	190	LEU

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	192/192 (100%)	181 (94%)	11 (6%)	18	23
1	L	192/192 (100%)	179 (93%)	13 (7%)	14	17
2	B	179/184 (97%)	158 (88%)	21 (12%)	5	5
2	H	179/184 (97%)	165 (92%)	14 (8%)	11	13
3	E	9/10 (90%)	8 (89%)	1 (11%)	6	6
3	F	10/10 (100%)	9 (90%)	1 (10%)	7	7
All	All	761/772 (99%)	700 (92%)	61 (8%)	11	13

5 of 61 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	193	GLN
2	H	179	LEU
1	L	86	GLU
2	H	170	VAL
3	E	6	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 26 such sidechains are listed below:

Mol	Chain	Res	Type
1	L	162	ASN
2	H	50	GLN
3	E	7	GLN
1	L	214	ASN
2	H	56	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 7 ligands modelled in this entry, 5 are monoatomic - leaving 2 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
5	OPE	E	101	4	7,7,7	0.65	0	9,9,9	1.76	2 (22%)
5	OPE	F	101	-	7,7,7	0.62	0	9,9,9	1.01	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	OPE	E	101	4	-	2/5/5/5	-
5	OPE	F	101	-	-	0/5/5/5	-

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	E	101	OPE	O4-P-O3	-3.80	96.16	106.44
5	E	101	OPE	O1-P-O4	2.43	113.01	106.67

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	E	101	OPE	O4-CA-CB-N
5	E	101	OPE	CA-O4-P-O1

There are no ring outliers.

2 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	E	101	OPE	3	0
5	F	101	OPE	4	1

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 [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	216/216 (100%)	-0.05	2 (0%) 81 79	17, 25, 39, 48	0
1	L	216/216 (100%)	0.04	2 (0%) 81 79	18, 27, 40, 49	0
2	B	211/216 (97%)	0.04	2 (0%) 81 79	17, 27, 40, 59	0
2	H	211/216 (97%)	0.18	6 (2%) 55 52	18, 29, 42, 52	0
3	E	9/10 (90%)	0.28	0 100 100	22, 25, 42, 47	0
3	F	10/10 (100%)	0.71	2 (20%) 3 2	22, 26, 52, 55	0
All	All	873/884 (98%)	0.06	14 (1%) 70 67	17, 27, 40, 59	0

The worst 5 of 14 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	134	GLY	4.4
2	H	214	PRO	3.4
3	F	3	ASN	3.0
2	H	134	GLY	2.8
1	A	23	CYS	2.7

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
4	ZN	E	102	1/1	0.73	0.15	30,30,30,30	1
4	ZN	B	301	1/1	0.92	0.08	30,30,30,30	1
5	OPE	E	101	8/8	0.92	0.11	44,49,51,51	0
5	OPE	F	101	8/8	0.93	0.10	23,36,40,44	0
4	ZN	H	301	1/1	0.95	0.04	30,30,30,30	0
4	ZN	A	301	1/1	0.99	0.14	30,30,30,30	0
4	ZN	L	301	1/1	0.99	0.04	30,30,30,30	0

6.5 Other polymers [i](#)

There are no such residues in this entry.