Full wwPDB X-ray Structure Validation Report ⓘ

May 27, 2026 – 12:11 PM EDT

PDB ID : 9ZG5 / pdb_00009zg5
Title : Structure of superfolder GFP bound to nanobody 15
Authors : Bahramimoghaddam, H.; Laganowsky, A.
Deposited on : 2025-12-02
Resolution : 3.40 Å(reported)

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

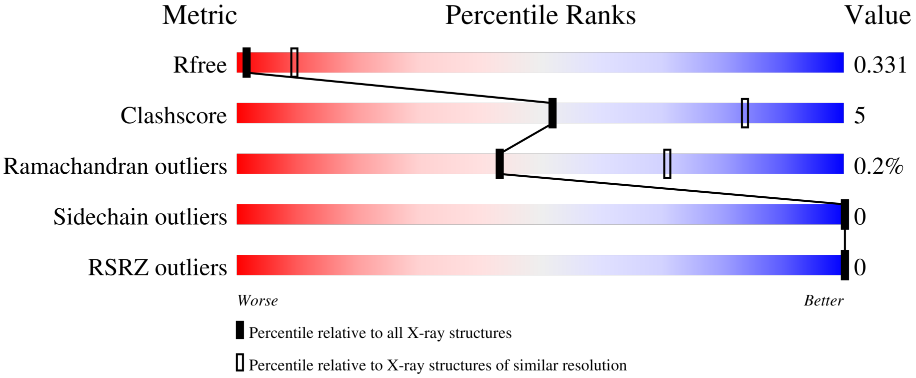
MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (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 3.40 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	1001 (3.44-3.36)
Clashscore	190562	1022 (3.44-3.36)
Ramachandran outliers	187476	1012 (3.44-3.36)
Sidechain outliers	187428	1012 (3.44-3.36)
RSRZ outliers	180081	1001 (3.44-3.36)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	**Chain**	**Length**	**Quality of chain**
1	A	239	
1	B	239	
1	E	239	
1	G	239	
2	C	130	

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Mol	Chain	Length	Quality of chain
2	D	130	
2	F	130	
2	H	130	

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 11330 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 Green fluorescent protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	232	Total 1848	C 1170	N 314	O 358	S 6	0	0	0
1	B	233	Total 1857	C 1176	N 316	O 359	S 6	0	0	0
1	E	233	Total 1857	C 1176	N 316	O 359	S 6	0	0	0
1	G	233	Total 1857	C 1176	N 316	O 359	S 6	0	0	0

There are 48 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	GLY	-	expression tag	UNP A0A059PIQ0
A	2	SER	-	expression tag	UNP A0A059PIQ0
A	3	LEU	-	expression tag	UNP A0A059PIQ0
A	4	SER	-	expression tag	UNP A0A059PIQ0
A	32	ARG	SER	conflict	UNP A0A059PIQ0
A	68	CRO	THR	chromophore	UNP A0A059PIQ0
A	68	CRO	TYR	chromophore	UNP A0A059PIQ0
A	68	CRO	GLY	chromophore	UNP A0A059PIQ0
A	74	SER	ALA	conflict	UNP A0A059PIQ0
A	142	GLU	LYS	conflict	UNP A0A059PIQ0
A	208	VAL	ALA	conflict	UNP A0A059PIQ0
A	241	LYS	ARG	conflict	UNP A0A059PIQ0
B	1	GLY	-	expression tag	UNP A0A059PIQ0
B	2	SER	-	expression tag	UNP A0A059PIQ0
B	3	LEU	-	expression tag	UNP A0A059PIQ0
B	4	SER	-	expression tag	UNP A0A059PIQ0
B	32	ARG	SER	conflict	UNP A0A059PIQ0
B	68	CRO	THR	chromophore	UNP A0A059PIQ0
B	68	CRO	TYR	chromophore	UNP A0A059PIQ0
B	68	CRO	GLY	chromophore	UNP A0A059PIQ0
B	74	SER	ALA	conflict	UNP A0A059PIQ0

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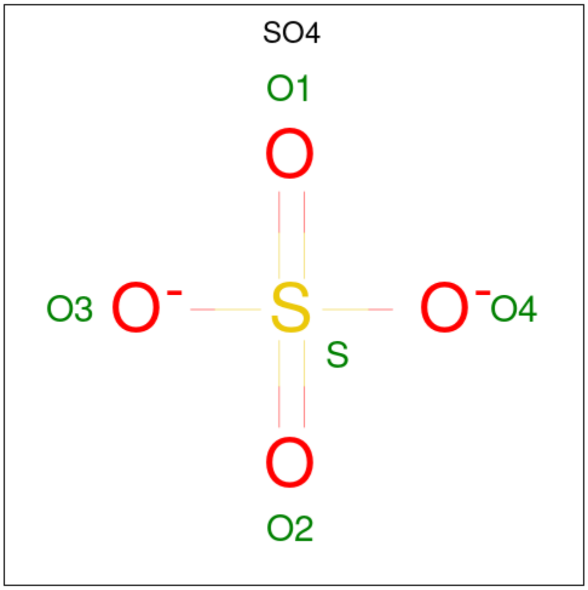
Chain	Residue	Modelled	Actual	Comment	Reference
B	142	GLU	LYS	conflict	UNP A0A059PIQ0
B	208	VAL	ALA	conflict	UNP A0A059PIQ0
B	241	LYS	ARG	conflict	UNP A0A059PIQ0
E	1	GLY	-	expression tag	UNP A0A059PIQ0
E	2	SER	-	expression tag	UNP A0A059PIQ0
E	3	LEU	-	expression tag	UNP A0A059PIQ0
E	4	SER	-	expression tag	UNP A0A059PIQ0
E	32	ARG	SER	conflict	UNP A0A059PIQ0
E	68	CRO	THR	chromophore	UNP A0A059PIQ0
E	68	CRO	TYR	chromophore	UNP A0A059PIQ0
E	68	CRO	GLY	chromophore	UNP A0A059PIQ0
E	74	SER	ALA	conflict	UNP A0A059PIQ0
E	142	GLU	LYS	conflict	UNP A0A059PIQ0
E	208	VAL	ALA	conflict	UNP A0A059PIQ0
E	241	LYS	ARG	conflict	UNP A0A059PIQ0
G	1	GLY	-	expression tag	UNP A0A059PIQ0
G	2	SER	-	expression tag	UNP A0A059PIQ0
G	3	LEU	-	expression tag	UNP A0A059PIQ0
G	4	SER	-	expression tag	UNP A0A059PIQ0
G	32	ARG	SER	conflict	UNP A0A059PIQ0
G	68	CRO	THR	chromophore	UNP A0A059PIQ0
G	68	CRO	TYR	chromophore	UNP A0A059PIQ0
G	68	CRO	GLY	chromophore	UNP A0A059PIQ0
G	74	SER	ALA	conflict	UNP A0A059PIQ0
G	142	GLU	LYS	conflict	UNP A0A059PIQ0
G	208	VAL	ALA	conflict	UNP A0A059PIQ0
G	241	LYS	ARG	conflict	UNP A0A059PIQ0

- Molecule 2 is a protein called Nanobody 15.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	130	Total 974	C 601	N 175	O 192	S 6	0	0	0
2	D	130	Total 974	C 601	N 175	O 192	S 6	0	0	0
2	F	130	Total 974	C 601	N 175	O 192	S 6	0	0	0
2	H	130	Total 974	C 601	N 175	O 192	S 6	0	0	0

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O_4S).



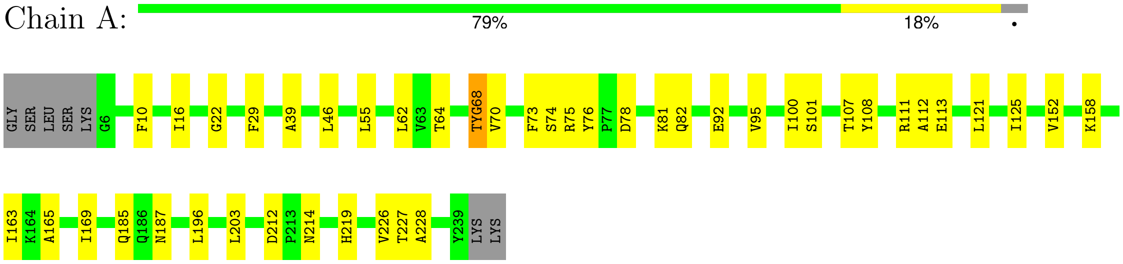
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total O S 5 4 1	0	0
3	E	1	Total O S 5 4 1	0	0
3	G	1	Total O S 5 4 1	0	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

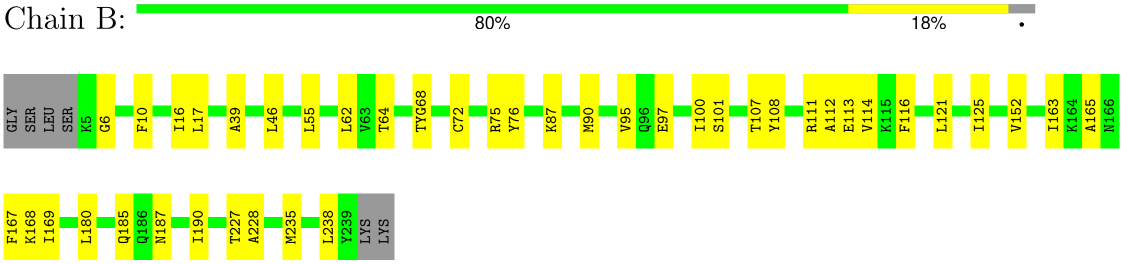
- Molecule 1: Green fluorescent protein

Chain A:



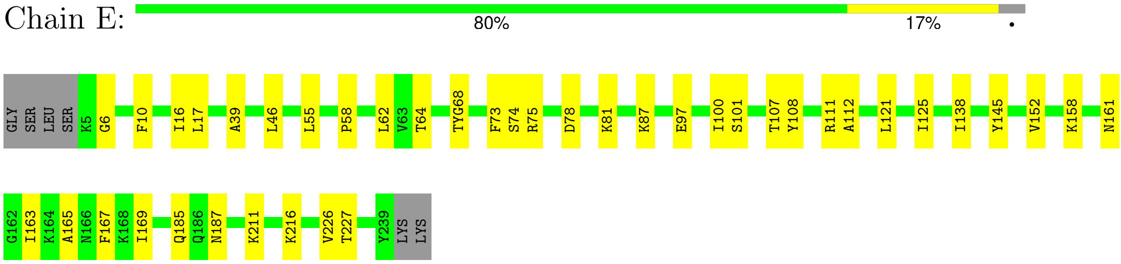
- Molecule 1: Green fluorescent protein

Chain B:



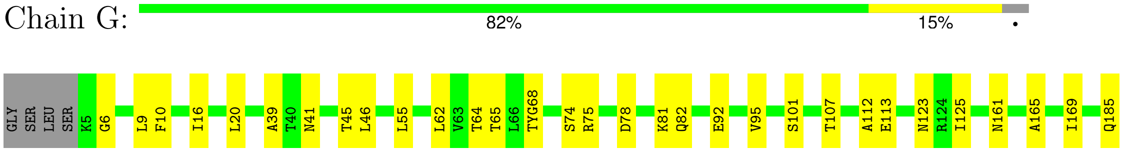
- Molecule 1: Green fluorescent protein

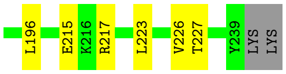
Chain E:



- Molecule 1: Green fluorescent protein

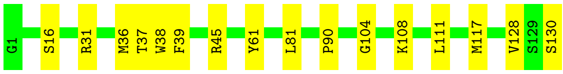
Chain G:





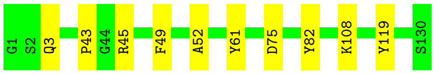
- Molecule 2: Nanobody 15

Chain C:



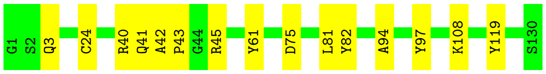
- Molecule 2: Nanobody 15

Chain D:



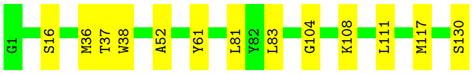
- Molecule 2: Nanobody 15

Chain F:



- Molecule 2: Nanobody 15

Chain H:



4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 32	Depositor
Cell constants a, b, c, α, β, γ	169.05Å 169.05Å 70.79Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	34.40 – 3.40 34.40 – 3.40	Depositor EDS
% Data completeness (in resolution range)	99.8 (34.40-3.40) 99.8 (34.40-3.40)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.93 (at 3.39Å)	Xtriage
Refinement program	PHENIX (1.21.2_5419: ???)	Depositor
R, R_{free}	0.295 , 0.331 0.295 , 0.331	Depositor DCC
R_{free} test set	1552 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	28.2	Xtriage
Anisotropy	0.193	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.25 , 0.0	EDS
L-test for twinning[2]	$< \|L\| > = 0.44$, $< L^2 > = 0.27$	Xtriage
Estimated twinning fraction	0.017 for -h,-k,l 0.387 for h,-h-k,-l 0.012 for -k,-h,-l	Xtriage
F_o,F_c correlation	0.88	EDS
Total number of atoms	11330	wwPDB-VP
Average B, all atoms (Å^2)	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 27.88 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 2.0325e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: CRO, SO4

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	0.11	0/1866	0.26	0/2524
1	B	0.13	0/1875	0.27	0/2535
1	E	0.11	0/1875	0.27	0/2535
1	G	0.13	0/1875	0.26	0/2535
2	C	0.09	0/989	0.23	0/1333
2	D	0.09	0/989	0.29	0/1333
2	F	0.10	0/989	0.25	0/1333
2	H	0.11	0/989	0.26	0/1333
All	All	0.11	0/11447	0.26	0/15461

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 ⓘ

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	1848	0	1781	25	0
1	B	1857	0	1794	22	0
1	E	1857	0	1794	21	0
1	G	1857	0	1794	20	0
2	C	974	0	960	10	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	974	0	960	5	0
2	F	974	0	960	8	0
2	H	974	0	960	7	0
3	A	5	0	0	0	0
3	E	5	0	0	0	0
3	G	5	0	0	0	0
All	All	11330	0	11003	113	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 (113) 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:A:165:ALA:HB3	1:A:185:GLN:HB3	1.66	0.76
1:G:165:ALA:HB3	1:G:185:GLN:HB3	1.68	0.74
1:E:165:ALA:HB3	1:E:185:GLN:HB3	1.70	0.74
1:A:75:ARG:HB3	1:A:227:THR:HG22	1.71	0.72
1:G:75:ARG:HB3	1:G:227:THR:HG22	1.70	0.72
1:B:235:MET:HG2	1:B:238:LEU:HD12	1.71	0.71
1:B:165:ALA:HB3	1:B:185:GLN:HB3	1.72	0.71
2:H:61:TYR:HB3	2:H:108:LYS:HE3	1.75	0.67
2:C:61:TYR:HB3	2:C:108:LYS:HE3	1.75	0.67
1:B:168:LYS:HD3	1:B:180:LEU:HD21	1.80	0.63
1:E:101:SER:HA	1:E:107:THR:HG22	1.83	0.61
2:F:61:TYR:HB3	2:F:108:LYS:HE3	1.82	0.60
1:A:112:ALA:HB2	1:A:125:ILE:HG23	1.84	0.59
1:B:101:SER:HA	1:B:107:THR:HG22	1.84	0.59
1:E:75:ARG:HB3	1:E:227:THR:HG22	1.82	0.59
1:B:100:ILE:HB	1:B:108:TYR:HB2	1.85	0.58
2:D:61:TYR:HB3	2:D:108:LYS:HE3	1.87	0.57
1:E:100:ILE:HB	1:E:108:TYR:HB2	1.87	0.56
1:G:112:ALA:HB2	1:G:125:ILE:HG23	1.86	0.56
1:E:112:ALA:HB2	1:E:125:ILE:HG23	1.89	0.55
1:G:64:THR:HG21	1:G:169:ILE:HG13	1.89	0.55
1:B:64:THR:HG21	1:B:169:ILE:HG13	1.89	0.54
1:E:74:SER:HA	1:E:226:VAL:HG13	1.89	0.54
1:B:75:ARG:HB3	1:B:227:THR:HG22	1.89	0.53
1:G:101:SER:HA	1:G:107:THR:HG22	1.91	0.53
2:F:42:ALA:HB1	2:F:43:PRO:HD2	1.89	0.52
1:E:64:THR:HG21	1:E:169:ILE:HG13	1.92	0.52

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Atom-1	**Atom-2**	**Interatomic distance (Å)**	**Clash overlap (Å)**
1:G:10:PHE:HB3	1:G:39:ALA:HB3	1.91	0.52
1:A:158:LYS:HD2	1:A:158:LYS:H	1.75	0.52
1:A:101:SER:HA	1:A:107:THR:HG22	1.90	0.51
1:G:78:ASP:HA	1:G:81:LYS:HD3	1.91	0.51
1:A:64:THR:HG21	1:A:169:ILE:HG13	1.92	0.51
1:A:78:ASP:HA	1:A:81:LYS:HD3	1.91	0.51
2:F:24:CYS:HB3	2:F:81:LEU:HB3	1.93	0.50
1:G:6:GLY:HA2	1:G:9:LEU:HD13	1.94	0.50
1:B:112:ALA:HB2	1:B:125:ILE:HG23	1.94	0.50
2:F:3:GLN:HB2	2:F:119:TYR:CE1	2.47	0.49
2:C:111:LEU:HD12	2:C:117:MET:HE1	1.94	0.49
2:D:75:ASP:HB2	2:D:82:TYR:HE2	1.77	0.49
1:B:95:VAL:HG22	1:B:113:GLU:HG2	1.95	0.49
1:G:95:VAL:HG22	1:G:113:GLU:HG2	1.95	0.49
2:F:75:ASP:HB2	2:F:82:TYR:HE2	1.79	0.48
1:B:10:PHE:HB3	1:B:39:ALA:HB3	1.95	0.48
2:H:111:LEU:HD12	2:H:117:MET:HE1	1.95	0.48
1:A:95:VAL:HG22	1:A:113:GLU:HG2	1.95	0.48
1:G:92:GLU:HA	2:H:104:GLY:H	1.78	0.48
1:A:10:PHE:HB3	1:A:39:ALA:HB3	1.95	0.47
2:F:40:ARG:HD3	2:F:94:ALA:HB3	1.96	0.47
1:A:92:GLU:HA	2:C:104:GLY:H	1.79	0.47
2:D:3:GLN:HB2	2:D:119:TYR:CE1	2.50	0.47
1:B:163:ILE:HG12	1:B:187:ASN:HB2	1.96	0.47
1:G:20:LEU:HD12	1:G:125:ILE:HD12	1.97	0.47
1:E:10:PHE:HB3	1:E:39:ALA:HB3	1.97	0.47
2:H:37:THR:HG23	2:H:52:ALA:HB2	1.96	0.47
2:C:37:THR:HG22	2:C:38:TRP:N	2.29	0.46
1:G:74:SER:HA	1:G:226:VAL:HG13	1.96	0.46
2:C:36:MET:HE2	2:C:81:LEU:HD22	1.98	0.46
1:A:55:LEU:HD21	1:A:62:LEU:HD12	1.98	0.46
2:C:45:ARG:HD2	2:D:43:PRO:O	2.16	0.46
1:A:82:GLN:HA	1:A:196:LEU:HD13	1.99	0.46
1:G:16:ILE:HB	1:G:46:LEU:HD21	1.97	0.45
2:C:90:PRO:HA	2:C:128:VAL:HB	1.97	0.45
2:F:41:GLN:HB2	2:F:97:TYR:HE1	1.82	0.45
1:A:100:ILE:HB	1:A:108:TYR:HB2	1.98	0.45
1:E:158:LYS:H	1:E:158:LYS:HD2	1.81	0.45
1:E:78:ASP:HA	1:E:81:LYS:HD3	1.99	0.45
2:F:42:ALA:HB3	2:F:45:ARG:HD3	1.97	0.45
1:A:73:PHE:CZ	1:A:121:LEU:HD12	2.52	0.45

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Atom-1	**Atom-2**	**Interatomic distance (Å)**	**Clash overlap (Å)**
1:B:95:VAL:HG23	1:B:190:ILE:HG12	1.99	0.45
2:H:36:MET:HE2	2:H:81:LEU:HD22	1.98	0.45
1:E:145:TYR:CZ	1:E:211:LYS:HE2	2.52	0.44
1:A:214:ASN:HA	1:E:216:LYS:HB2	1.99	0.44
1:G:55:LEU:HD21	1:G:62:LEU:HD12	1.99	0.44
1:B:16:ILE:HB	1:B:46:LEU:HD21	2.00	0.44
1:E:55:LEU:HD21	1:E:62:LEU:HD12	2.00	0.44
1:B:97:GLU:HG2	1:B:111:ARG:HG3	1.99	0.44
1:G:82:GLN:HA	1:G:196:LEU:HD13	1.98	0.44
1:A:111:ARG:NH1	2:C:31:ARG:HE	2.16	0.44
1:A:212:ASP:H	1:A:219:HIS:CD2	2.35	0.44
1:E:163:ILE:HG12	1:E:187:ASN:HB2	2.00	0.44
2:C:37:THR:HG21	2:C:39:PHE:CE1	2.53	0.44
1:E:97:GLU:HG2	1:E:111:ARG:HG3	2.00	0.44
1:A:74:SER:HA	1:A:226:VAL:HG13	1.99	0.43
2:D:49:PHE:HE1	2:D:52:ALA:HB2	1.84	0.43
1:E:16:ILE:HB	1:E:46:LEU:HD21	2.00	0.43
1:G:215:GLU:HG3	1:G:217:ARG:H	1.82	0.43
1:E:6:GLY:HA3	1:E:87:LYS:O	2.19	0.43
1:A:76:TYR:HA	1:A:228:ALA:HB3	2.00	0.43
1:B:72:CYS:SG	1:B:121:LEU:HD11	2.59	0.43
2:H:16:SER:HB2	2:H:130:SER:HA	2.01	0.43
2:H:38:TRP:CG	2:H:83:LEU:HD22	2.54	0.42
1:B:116:PHE:CE2	1:B:121:LEU:HD12	2.54	0.42
1:B:76:TYR:HA	1:B:228:ALA:HB3	2.01	0.42
1:B:152:VAL:HG13	1:B:167:PHE:CD1	2.54	0.42
1:G:41:ASN:HA	1:G:75:ARG:HD2	2.02	0.42
1:B:16:ILE:O	1:B:17:LEU:HD12	2.18	0.42
1:A:68:CRO:HA1	1:A:70:VAL:HG22	2.02	0.42
1:E:16:ILE:O	1:E:17:LEU:HD12	2.20	0.42
1:E:73:PHE:CZ	1:E:121:LEU:HD13	2.55	0.42
1:G:65:THR:HG22	1:G:125:ILE:HD13	2.02	0.42
1:A:22:GLY:HA3	1:A:29:PHE:CZ	2.55	0.41
1:B:6:GLY:HA3	1:B:87:LYS:O	2.20	0.41
1:A:152:VAL:HB	1:A:203:LEU:HB2	2.03	0.41
1:G:112:ALA:HB1	1:G:123:ASN:HD21	1.85	0.41
1:A:16:ILE:HB	1:A:46:LEU:HD21	2.02	0.41
1:A:121:LEU:HD23	1:A:121:LEU:HA	1.89	0.41
1:E:58:PRO:HD3	1:E:138:ILE:O	2.21	0.41
1:G:45:THR:HG22	1:G:223:LEU:HD13	2.03	0.41
1:B:55:LEU:HD21	1:B:62:LEU:HD12	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:152:VAL:HG13	1:E:167:PHE:CD1	2.55	0.40
1:A:163:ILE:HG12	1:A:187:ASN:HB2	2.03	0.40
2:C:16:SER:HB2	2:C:130:SER:HA	2.04	0.40
1:B:90:MET:HE1	1:B:114:VAL:HG12	2.03	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	227/239 (95%)	217 (96%)	10 (4%)	0	100	100
1	B	228/239 (95%)	221 (97%)	7 (3%)	0	100	100
1	E	228/239 (95%)	222 (97%)	5 (2%)	1 (0%)	30	59
1	G	228/239 (95%)	222 (97%)	5 (2%)	1 (0%)	30	59
2	C	128/130 (98%)	123 (96%)	5 (4%)	0	100	100
2	D	128/130 (98%)	120 (94%)	7 (6%)	1 (1%)	16	44
2	F	128/130 (98%)	123 (96%)	5 (4%)	0	100	100
2	H	128/130 (98%)	122 (95%)	6 (5%)	0	100	100
All	All	1423/1476 (96%)	1370 (96%)	50 (4%)	3 (0%)	43	71

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	45	ARG
1	E	161	ASN
1	G	161	ASN

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	201/208 (97%)	201 (100%)	0	100	100
1	B	202/208 (97%)	202 (100%)	0	100	100
1	E	202/208 (97%)	202 (100%)	0	100	100
1	G	202/208 (97%)	202 (100%)	0	100	100
2	C	102/102 (100%)	102 (100%)	0	100	100
2	D	102/102 (100%)	102 (100%)	0	100	100
2	F	102/102 (100%)	102 (100%)	0	100	100
2	H	102/102 (100%)	102 (100%)	0	100	100
All	All	1215/1240 (98%)	1215 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
2	D	41	GLN
1	E	186	GLN
1	G	123	ASN
1	G	214	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

4 non-standard protein/DNA/RNA residues 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	$\#\|Z\| > 2$
1	CRO	B	68	1	22,23,24	0.86	0	30,32,34	0.99	1 (3%)
1	CRO	A	68	1	22,23,24	0.88	1 (4%)	30,32,34	1.07	1 (3%)
1	CRO	G	68	1	22,23,24	0.86	1 (4%)	30,32,34	1.04	1 (3%)
1	CRO	E	68	1	22,23,24	0.87	1 (4%)	30,32,34	1.02	2 (6%)

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
1	CRO	B	68	1	-	1/12/31/32	0/2/2/2
1	CRO	A	68	1	-	1/12/31/32	0/2/2/2
1	CRO	G	68	1	-	1/12/31/32	0/2/2/2
1	CRO	E	68	1	-	1/12/31/32	0/2/2/2

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	68	CRO	C1-N2	-2.16	1.29	1.32
1	G	68	CRO	C1-N2	-2.07	1.29	1.32
1	E	68	CRO	C1-N2	-2.02	1.29	1.32

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	68	CRO	N3-C1-N2	3.63	114.34	111.48
1	G	68	CRO	N3-C1-N2	3.60	114.32	111.48
1	E	68	CRO	N3-C1-N2	3.41	114.17	111.48
1	B	68	CRO	N3-C1-N2	3.30	114.09	111.48
1	E	68	CRO	CA1-C1-N3	-2.09	122.21	124.69

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	68	CRO	C3-CA3-N3-C2
1	B	68	CRO	C3-CA3-N3-C2
1	E	68	CRO	C3-CA3-N3-C2
1	G	68	CRO	C3-CA3-N3-C2

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	68	CRO	1	0

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

3 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	$\#\|Z\| > 2$
3	SO4	A	301	-	4,4,4	0.68	0	6,6,6	0.10	0
3	SO4	G	301	-	4,4,4	0.70	0	6,6,6	0.12	0
3	SO4	E	301	-	4,4,4	0.69	0	6,6,6	0.09	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	231/239 (96%)	-1.39	0	100	100	11, 18, 35, 61	0
1	B	232/239 (97%)	-1.42	0	100	100	9, 15, 30, 60	0
1	E	232/239 (97%)	-1.41	0	100	100	10, 16, 32, 57	0
1	G	232/239 (97%)	-1.38	0	100	100	11, 18, 37, 62	0
2	C	130/130 (100%)	-1.32	0	100	100	13, 23, 39, 48	0
2	D	130/130 (100%)	-1.29	0	100	100	13, 31, 53, 65	0
2	F	130/130 (100%)	-1.26	0	100	100	15, 31, 56, 75	0
2	H	130/130 (100%)	-1.36	0	100	100	12, 23, 40, 50	0
All	All	1447/1476 (98%)	-1.37	0	100	100	9, 19, 46, 75	0

There are no RSRZ outliers to report.

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

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
1	CRO	A	68	22/23	0.99	0.04	16,20,28,33	0
1	CRO	B	68	22/23	0.99	0.04	9,13,18,21	0
1	CRO	G	68	22/23	0.99	0.05	15,20,27,32	0
1	CRO	E	68	22/23	1.00	0.04	9,12,19,21	0

6.3 Carbohydrates

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($Å^2$)	Q<0.9
3	SO4	G	301	5/5	0.98	0.06	34,34,39,47	0
3	SO4	A	301	5/5	0.99	0.04	27,28,43,44	0
3	SO4	E	301	5/5	1.00	0.02	30,31,36,41	0

6.5 Other polymers ⓘ

There are no such residues in this entry.