



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 6, 2026 – 11:39 PM UTC

PDB ID : 5D3E / pdb_00005d3e
Title : Crystal structure of human 14-3-3 gamma in complex with CFTR R-domain peptide pS768-pS795
Authors : Stevers, L.M.; Leysen, S.F.R.; Ottmann, C.
Deposited on : 2015-08-06
Resolution : 2.75 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

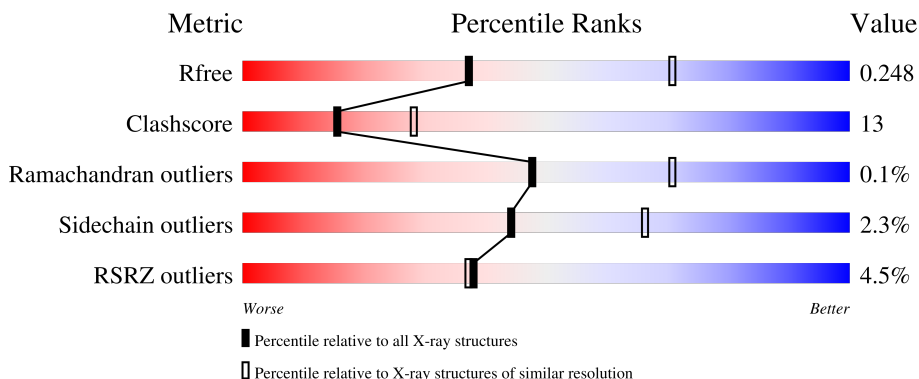
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.75 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	1009 (2.76-2.76)
Clashscore	190562	1044 (2.76-2.76)
Ramachandran outliers	187476	1024 (2.76-2.76)
Sidechain outliers	187428	1024 (2.76-2.76)
RSRZ outliers	180081	1009 (2.76-2.76)

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	241	 83% 14% 2% 1% 0%
1	B	241	 77% 21% 2% 2% 0%
1	E	241	 76% 21% 0% 0% 3%
1	F	241	 81% 16% 2% 2% 0%
1	I	241	 71% 24% 2% 2% 0%

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Mol	Chain	Length	Quality of chain
1	J	241	<p>15% 54% 36% 7%</p>
2	C	40	<p>12% 12% 10% 5% 72%</p>
2	G	40	<p>12% 18% 8% 72%</p>
2	K	40	<p>5% 8% 88%</p>

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 11713 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 14-3-3 protein gamma.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	235	1902	1186	324	383	9	0	1	0
1	B	238	1915	1194	326	384	11	0	0	0
1	E	234	1900	1186	323	382	9	0	2	0
1	F	238	1921	1198	326	386	11	0	1	0
1	I	235	1897	1183	323	382	9	0	0	0
1	J	224	1814	1135	311	359	9	0	0	0

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	MET	-	initiating methionine	UNP P61981
A	-1	GLY	-	expression tag	UNP P61981
A	0	SER	-	expression tag	UNP P61981
B	-2	MET	-	initiating methionine	UNP P61981
B	-1	GLY	-	expression tag	UNP P61981
B	0	SER	-	expression tag	UNP P61981
E	-2	MET	-	initiating methionine	UNP P61981
E	-1	GLY	-	expression tag	UNP P61981
E	0	SER	-	expression tag	UNP P61981
F	-2	MET	-	initiating methionine	UNP P61981
F	-1	GLY	-	expression tag	UNP P61981
F	0	SER	-	expression tag	UNP P61981
I	-2	MET	-	initiating methionine	UNP P61981
I	-1	GLY	-	expression tag	UNP P61981
I	0	SER	-	expression tag	UNP P61981
J	-2	MET	-	initiating methionine	UNP P61981
J	-1	GLY	-	expression tag	UNP P61981

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Chain	Residue	Modelled	Actual	Comment	Reference
J	0	SER	-	expression tag	UNP P61981

- Molecule 2 is a protein called Cystic fibrosis transmembrane conductance regulator.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	11	Total	C	N	O	P	0	0	0
			91	53	16	20	2			
2	G	11	Total	C	N	O	P	0	0	0
			88	51	14	21	2			
2	K	5	Total	C	N	O	P	0	0	0
			44	22	6	14	2			

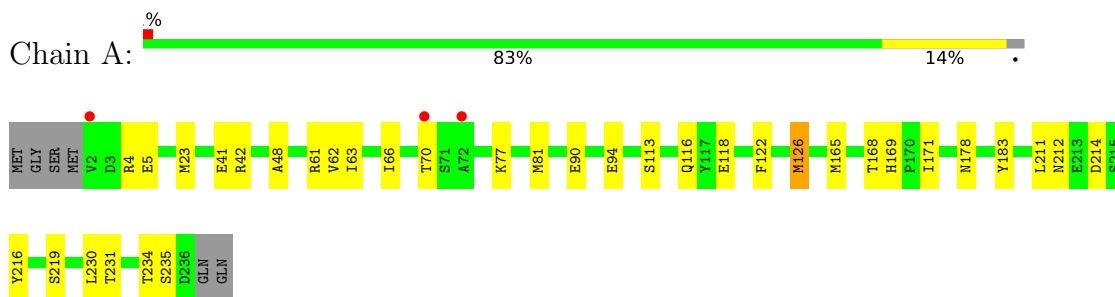
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	34	Total	O	0	0
			34	34		
3	B	19	Total	O	0	0
			19	19		
3	C	1	Total	O	0	0
			1	1		
3	E	37	Total	O	0	0
			37	37		
3	F	34	Total	O	0	0
			34	34		
3	G	1	Total	O	0	0
			1	1		
3	I	12	Total	O	0	0
			12	12		
3	J	2	Total	O	0	0
			2	2		
3	K	1	Total	O	0	0
			1	1		

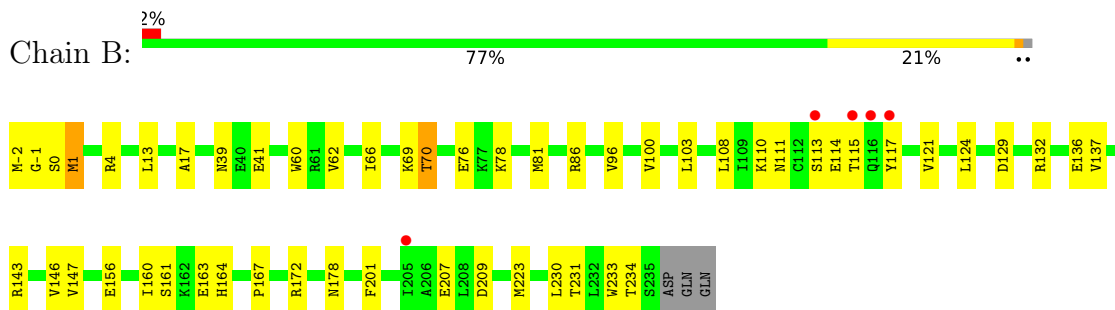
3 Residue-property plots

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.

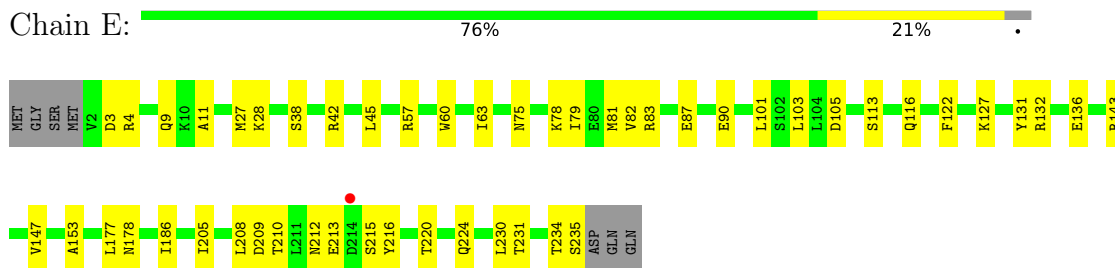
- Molecule 1: 14-3-3 protein gamma



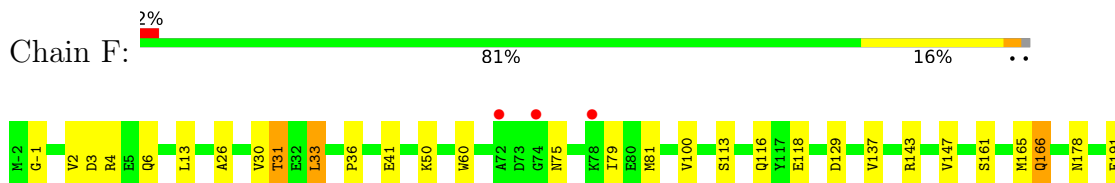
- Molecule 1: 14-3-3 protein gamma



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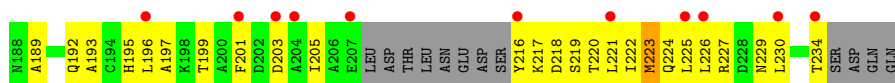
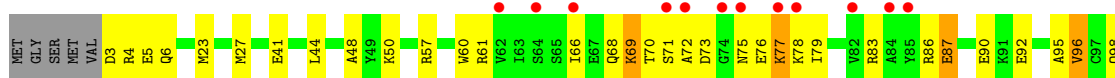




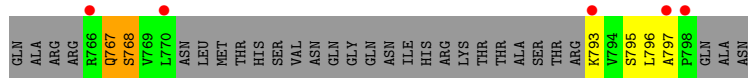
- Molecule 1: 14-3-3 protein gamma



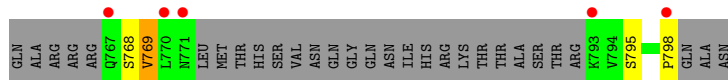
- Molecule 1: 14-3-3 protein gamma



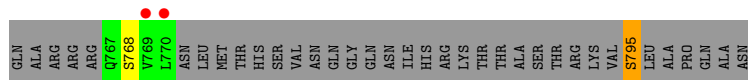
- Molecule 2: Cystic fibrosis transmembrane conductance regulator



- Molecule 2: Cystic fibrosis transmembrane conductance regulator



- Molecule 2: Cystic fibrosis transmembrane conductance regulator



4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α , β , γ	122.45Å 122.45Å 313.16Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	36.30 – 2.75 36.30 – 2.75	Depositor EDS
% Data completeness (in resolution range)	100.0 (36.30-2.75) 98.3 (36.30-2.75)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.03 (at 2.77Å)	Xtrriage
Refinement program	PHENIX 1.8.4_1496	Depositor
R, R_{free}	0.202 , 0.244 0.206 , 0.248	Depositor DCC
R_{free} test set	3060 reflections (4.87%)	wwPDB-VP
Wilson B-factor (Å ²)	52.2	Xtrriage
Anisotropy	0.023	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 49.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	11713	wwPDB-VP
Average B, all atoms (Å ²)	63.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.32% 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: SEP

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	1.04	1/1934 (0.1%)	0.92	1/2610 (0.0%)
1	B	0.81	0/1943	0.84	3/2620 (0.1%)
1	E	0.75	0/1935	0.87	1/2612 (0.0%)
1	F	1.03	3/1952 (0.2%)	0.92	4/2632 (0.2%)
1	I	0.94	0/1925	0.97	7/2598 (0.3%)
1	J	0.64	1/1841 (0.1%)	0.94	9/2481 (0.4%)
2	C	0.79	0/68	1.03	1/86 (1.2%)
2	G	0.78	0/65	0.76	0/83
2	K	0.77	0/22	0.63	0/27
All	All	0.88	5/11685 (0.0%)	0.91	26/15749 (0.2%)

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	J	169	HIS	C-N	5.60	1.40	1.34
1	A	183	TYR	C-O	-5.49	1.17	1.24
1	F	36	PRO	N-CD	5.23	1.55	1.47
1	F	31	THR	C-O	-5.08	1.18	1.24
1	F	166	GLN	C-N	5.00	1.39	1.33

The worst 5 of 26 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	J	218	ASP	N-CA-C	-8.94	100.97	112.23
1	F	33	LEU	N-CA-C	-8.78	98.12	110.50
1	J	77	LYS	N-CA-C	-8.13	101.77	112.34
1	B	108	LEU	N-CA-C	7.48	119.22	111.14
1	I	4	ARG	N-CA-C	-7.34	102.31	111.11

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	1902	0	1867	23	0
1	B	1915	0	1888	44	2
1	E	1900	0	1869	35	0
1	F	1921	0	1894	38	1
1	I	1897	0	1863	62	3
1	J	1814	0	1790	115	6
2	C	91	0	90	3	0
2	G	88	0	84	5	0
2	K	44	0	35	1	0
3	A	34	0	0	2	0
3	B	19	0	0	0	0
3	C	1	0	0	0	0
3	E	37	0	0	0	0
3	F	34	0	0	0	0
3	G	1	0	0	0	0
3	I	12	0	0	0	0
3	J	2	0	0	0	0
3	K	1	0	0	0	0
All	All	11713	0	11380	308	9

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 308 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:J:182:PHE:CE1	1:J:186:ILE:HG21	1.29	1.62
1:J:182:PHE:CE1	1:J:186:ILE:CG2	1.82	1.55
1:J:182:PHE:HE1	1:J:186:ILE:CG2	1.21	1.34
1:J:182:PHE:CD1	1:J:186:ILE:HG21	1.71	1.25
1:J:182:PHE:CD1	1:J:186:ILE:CG2	2.22	1.21

The worst 5 of 9 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)
1:J:224:GLN:CD	1:J:224:GLN:OE1[8_665]	0.42	1.78
1:J:224:GLN:OE1	1:J:224:GLN:NE2[8_665]	0.92	1.28
1:J:224:GLN:CD	1:J:224:GLN:CD[8_665]	0.99	1.21
1:J:224:GLN:OE1	1:J:224:GLN:OE1[8_665]	1.55	0.65
1:J:224:GLN:CG	1:J:224:GLN:OE1[8_665]	1.68	0.52

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	234/241 (97%)	229 (98%)	5 (2%)	0	100	100
1	B	236/241 (98%)	229 (97%)	6 (2%)	1 (0%)	30	50
1	E	234/241 (97%)	231 (99%)	3 (1%)	0	100	100
1	F	237/241 (98%)	233 (98%)	4 (2%)	0	100	100
1	I	233/241 (97%)	228 (98%)	5 (2%)	0	100	100
1	J	220/241 (91%)	207 (94%)	13 (6%)	0	100	100
2	C	5/40 (12%)	4 (80%)	0	1 (20%)	0	0
2	G	5/40 (12%)	4 (80%)	1 (20%)	0	100	100
2	K	1/40 (2%)	1 (100%)	0	0	100	100
All	All	1405/1566 (90%)	1366 (97%)	37 (3%)	2 (0%)	48	71

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	C	767	GLN
1	B	-1	GLY

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	208/212 (98%)	205 (99%)	3 (1%)	59	75
1	B	209/212 (99%)	205 (98%)	4 (2%)	50	70
1	E	208/212 (98%)	207 (100%)	1 (0%)	81	89
1	F	210/212 (99%)	205 (98%)	5 (2%)	43	65
1	I	207/212 (98%)	198 (96%)	9 (4%)	26	47
1	J	196/212 (92%)	190 (97%)	6 (3%)	35	59
2	C	8/33 (24%)	8 (100%)	0	100	100
2	G	8/33 (24%)	7 (88%)	1 (12%)	4	8
2	K	3/33 (9%)	3 (100%)	0	100	100
All	All	1257/1371 (92%)	1228 (98%)	29 (2%)	44	66

5 of 29 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	I	32	GLU
1	J	205	ILE
1	I	39	ASN
1	J	87	GLU
1	I	37	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 14 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	116	GLN
1	F	158	HIS
1	J	166	GLN
1	J	29	ASN
1	J	51	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](#)

6 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
2	SEP	C	768	2	8,9,10	1.59	1 (12%)	7,12,14	1.47	1 (14%)
2	SEP	G	768	2	8,9,10	1.95	4 (50%)	7,12,14	2.20	2 (28%)
2	SEP	C	795	2	8,9,10	1.94	3 (37%)	7,12,14	1.90	3 (42%)
2	SEP	K	795	-	8,9,10	1.67	2 (25%)	7,12,14	1.61	1 (14%)
2	SEP	K	768	2	8,9,10	1.54	1 (12%)	7,12,14	1.19	0
2	SEP	G	795	2	8,9,10	2.10	4 (50%)	7,12,14	1.30	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
2	SEP	C	768	2	-	0/6/8/10	-
2	SEP	G	768	2	-	4/6/8/10	-
2	SEP	C	795	2	-	0/6/8/10	-
2	SEP	K	795	-	-	0/6/8/10	-
2	SEP	K	768	2	-	1/6/8/10	-
2	SEP	G	795	2	-	0/6/8/10	-

The worst 5 of 15 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	K	795	SEP	P-O1P	3.56	1.61	1.50
2	C	768	SEP	P-O1P	3.49	1.61	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	K	768	SEP	P-O1P	3.45	1.61	1.50
2	G	768	SEP	P-O2P	-3.13	1.43	1.54
2	G	795	SEP	P-O3P	-3.12	1.43	1.54

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	G	768	SEP	OG-CB-CA	4.20	112.23	108.14
2	K	795	SEP	OG-CB-CA	3.74	111.78	108.14
2	C	795	SEP	OG-CB-CA	3.17	111.23	108.14
2	C	768	SEP	O3P-P-OG	2.74	113.82	106.67
2	G	768	SEP	OG-P-O1P	-2.72	99.08	106.44

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	G	768	SEP	CB-OG-P-O2P
2	G	768	SEP	CB-OG-P-O3P
2	G	768	SEP	CB-OG-P-O1P
2	G	768	SEP	N-CA-CB-OG
2	K	768	SEP	CB-OG-P-O3P

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	768	SEP	1	0
2	K	795	SEP	1	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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	235/241 (97%)	-0.42	3 (1%) 75 75	23, 43, 85, 126	1 (0%)
1	B	238/241 (98%)	-0.08	5 (2%) 63 61	30, 56, 106, 139	0
1	E	234/241 (97%)	-0.33	1 (0%) 88 89	22, 47, 85, 119	2 (0%)
1	F	238/241 (98%)	-0.29	4 (1%) 69 67	24, 46, 87, 106	1 (0%)
1	I	235/241 (97%)	-0.05	4 (1%) 69 67	25, 58, 96, 126	0
1	J	224/241 (92%)	1.05	35 (15%) 5 4	47, 104, 146, 162	0
2	C	9/40 (22%)	2.12	5 (55%) 0 0	62, 75, 96, 100	0
2	G	9/40 (22%)	1.90	5 (55%) 0 0	46, 69, 105, 105	0
2	K	3/40 (7%)	2.01	2 (66%) 0 0	57, 57, 72, 84	0
All	All	1425/1566 (90%)	-0.00	64 (4%) 38 37	22, 55, 124, 162	4 (0%)

The worst 5 of 64 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	I	2	VAL	4.2
2	C	770	LEU	4.1
2	C	798	PRO	3.8
1	I	99	ASP	3.8
1	J	168	THR	3.7

6.2 Non-standard residues in protein, DNA, RNA chains [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(\AA^2)	Q<0.9
2	SEP	K	795	10/11	0.83	0.12	86,104,117,117	0
2	SEP	G	768	10/11	0.96	0.10	39,47,63,70	0
2	SEP	G	795	10/11	0.97	0.08	33,43,47,57	0
2	SEP	C	768	10/11	0.97	0.08	40,52,55,61	0
2	SEP	K	768	10/11	0.98	0.07	36,48,61,62	0
2	SEP	C	795	10/11	0.98	0.06	39,55,66,69	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.