



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 9, 2026 – 04:09 PM UTC

PDB ID : 3JQO / pdb_00003jqo
Title : Crystal structure of the outer membrane complex of a type IV secretion system
Authors : Chandran, V.; Fronzes, R.; Duquerroy, S.; Cronin, N.; Navaza, J.; Waksman, G.
Deposited on : 2009-09-07
Resolution : 2.60 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

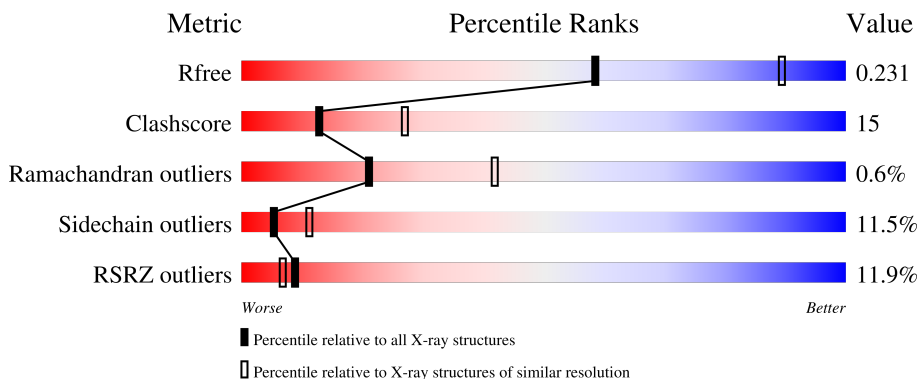
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION





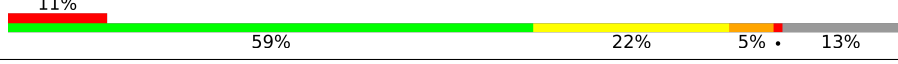
The reported resolution of this entry is 2.60 Å.

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	4008 (2.60-2.60)
Clashscore	190562	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)
RSRZ outliers	180081	4008 (2.60-2.60)

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	227	
1	D	227	
1	G	227	
1	J	227	
1	M	227	


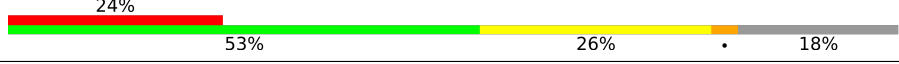



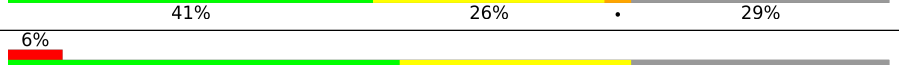


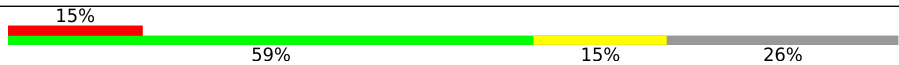
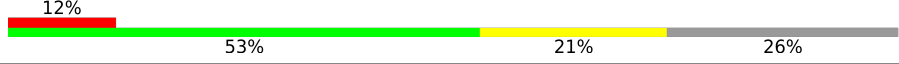
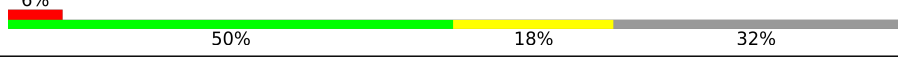

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Mol	Chain	Length	Quality of chain
1	P	227	11% 60% 22% . 13%
1	S	227	10% 63% 19% . 13%
1	V	227	10% 59% 23% . 14%
1	Y	227	10% 61% 20% . . 14%
1	b	227	9% 59% 22% . . 14%
1	e	227	10% 63% 18% . . 14%
1	h	227	9% 61% 21% . . 14%
1	k	227	9% 61% 22% . . 14%
1	n	227	11% 59% 22% . . 14%
2	B	135	12% 68% 22% . . .
2	E	135	10% 66% 24% . . .
2	H	135	10% 60% 31% . . .
2	K	135	12% 66% 24% 5% . .
2	N	135	10% 65% 24% 5% . .
2	Q	135	10% 63% 27% 5% . .
2	T	135	12% 64% 24% 7% . .
2	W	135	10% 70% 19% 6% . .
2	Z	135	8% 64% 24% 6% . .
2	c	135	10% 70% 20% 5% . .
2	f	135	12% 65% 24% 6% . .
2	i	135	10% 67% 21% 6% . .
2	l	135	11% 67% 21% 6% . .
2	o	135	11% 65% 22% 7% . .
3	C	34	18% 47% 24% 6% 24%
3	F	34	12% 56% 15% . 26%

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Mol	Chain	Length	Quality of chain
3	I	34	
3	L	34	
3	O	34	
3	R	34	
3	U	34	
3	X	34	
3	a	34	
3	d	34	
3	g	34	
3	j	34	
3	m	34	
3	p	34	

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	LDA	J	1	-	-	X	-

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 38842 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 TraF protein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	195	1448	898	253	290	2	5	0	0	0
1	D	195	1448	898	253	290	2	5	0	0	0
1	G	193	1437	890	252	288	2	5	0	0	0
1	J	197	1457	903	256	291	2	5	0	0	0
1	M	197	1461	905	256	293	2	5	0	0	0
1	P	197	1461	905	256	293	2	5	0	0	0
1	S	197	1461	905	256	293	2	5	0	0	0
1	V	196	1457	903	255	292	2	5	0	0	0
1	Y	195	1448	898	253	290	2	5	0	0	0
1	b	195	1449	898	254	290	2	5	0	0	0
1	e	196	1457	903	255	292	2	5	0	0	0
1	h	195	1439	893	250	289	2	5	0	0	0
1	k	196	1457	903	255	292	2	5	0	0	0
1	n	196	1457	900	256	294	2	5	0	0	0

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	308	ARG	ALA	SEE REMARK 999	UNP Q46705

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Chain	Residue	Modelled	Actual	Comment	Reference
D	308	ARG	ALA	SEE REMARK 999	UNP Q46705
G	308	ARG	ALA	SEE REMARK 999	UNP Q46705
J	308	ARG	ALA	SEE REMARK 999	UNP Q46705
M	308	ARG	ALA	SEE REMARK 999	UNP Q46705
P	308	ARG	ALA	SEE REMARK 999	UNP Q46705
S	308	ARG	ALA	SEE REMARK 999	UNP Q46705
V	308	ARG	ALA	SEE REMARK 999	UNP Q46705
Y	308	ARG	ALA	SEE REMARK 999	UNP Q46705
b	308	ARG	ALA	SEE REMARK 999	UNP Q46705
e	308	ARG	ALA	SEE REMARK 999	UNP Q46705
h	308	ARG	ALA	SEE REMARK 999	UNP Q46705
k	308	ARG	ALA	SEE REMARK 999	UNP Q46705
n	308	ARG	ALA	SEE REMARK 999	UNP Q46705

- Molecule 2 is a protein called TraO protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	Se			
2	B	130	1033	648	193	189	3	0	0	0
2	E	130	1033	648	193	189	3	0	0	0
2	H	130	1033	648	193	189	3	0	0	0
2	K	130	1033	648	193	189	3	0	0	0
2	N	130	1033	648	193	189	3	0	0	0
2	Q	130	1033	648	193	189	3	0	0	0
2	T	130	1033	648	193	189	3	0	0	0
2	W	130	1033	648	193	189	3	0	0	0
2	Z	130	1033	648	193	189	3	0	0	0
2	c	130	1033	648	193	189	3	0	0	0
2	f	130	1033	648	193	189	3	0	0	0
2	i	130	1033	648	193	189	3	0	0	0
2	l	130	1033	648	193	189	3	0	0	0

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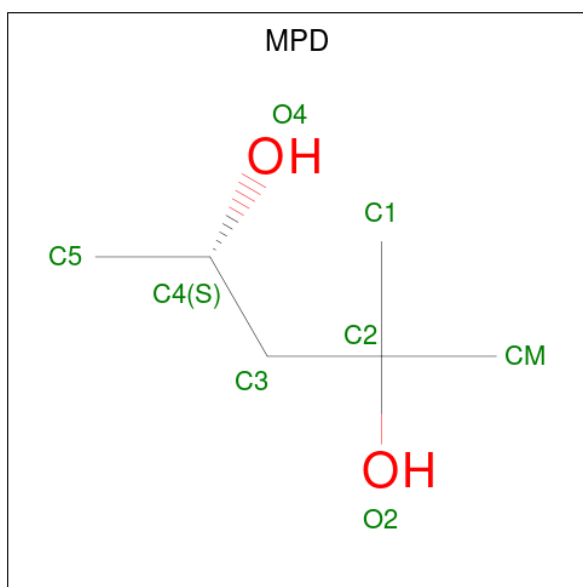
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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	o	130	Total	C	N	O	Se	0	0	0
			1032	647	193	189	3			

- Molecule 3 is a protein called TraN protein.

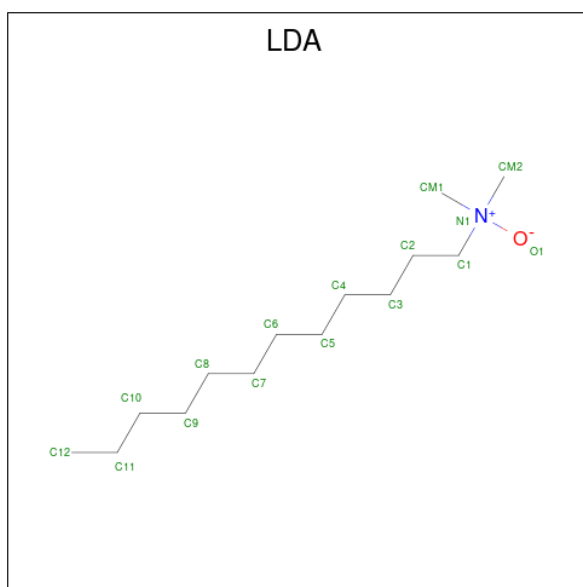
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	26	Total	C	N	O	0	0	0	
			200	126	34	40				
3	F	25	Total	C	N	O	0	0	0	
			194	123	33	38				
3	I	25	Total	C	N	O	0	0	0	
			194	123	33	38				
3	L	28	Total	C	N	O	S	0	0	0
			212	132	36	43	1			
3	O	24	Total	C	N	O	0	0	0	
			190	121	32	37				
3	R	24	Total	C	N	O	0	0	0	
			185	118	31	36				
3	U	27	Total	C	N	O	0	0	0	
			206	129	35	42				
3	X	24	Total	C	N	O	0	0	0	
			190	121	32	37				
3	a	24	Total	C	N	O	0	0	0	
			190	121	32	37				
3	d	24	Total	C	N	O	0	0	0	
			190	121	32	37				
3	g	25	Total	C	N	O	0	0	0	
			194	123	33	38				
3	j	25	Total	C	N	O	0	0	0	
			194	123	33	38				
3	m	25	Total	C	N	O	0	0	0	
			194	123	33	38				
3	p	23	Total	C	N	O	0	0	0	
			181	116	30	35				

- Molecule 4 is (4S)-2-METHYL-2,4-PENTANEDIOL (CCD ID: MPD) (formula: C₆H₁₄O₂).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	D	1	Total C O 8 6 2	0	0
4	h	1	Total C O 8 6 2	0	0
4	k	1	Total C O 8 6 2	0	0

- Molecule 5 is LAURYL DIMETHYLAMINE-N-OXIDE (CCD ID: LDA) (formula: $C_{14}H_{31}NO$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	J	1	Total C N O 16 14 1 1	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	65	Total O 65 65	0	0
6	B	31	Total O 31 31	0	0
6	C	7	Total O 7 7	0	0
6	D	65	Total O 65 65	0	0
6	E	28	Total O 28 28	0	0
6	F	9	Total O 9 9	0	0
6	G	50	Total O 50 50	0	0
6	H	22	Total O 22 22	0	0
6	I	9	Total O 9 9	0	0
6	J	49	Total O 49 49	0	0
6	K	30	Total O 30 30	0	0
6	L	12	Total O 12 12	0	0
6	M	48	Total O 48 48	0	0
6	N	35	Total O 35 35	0	0
6	O	11	Total O 11 11	0	0
6	P	58	Total O 58 58	0	0
6	Q	27	Total O 27 27	0	0
6	R	7	Total O 7 7	0	0
6	S	57	Total O 57 57	0	0
6	T	21	Total O 21 21	0	0
6	U	10	Total O 10 10	0	0

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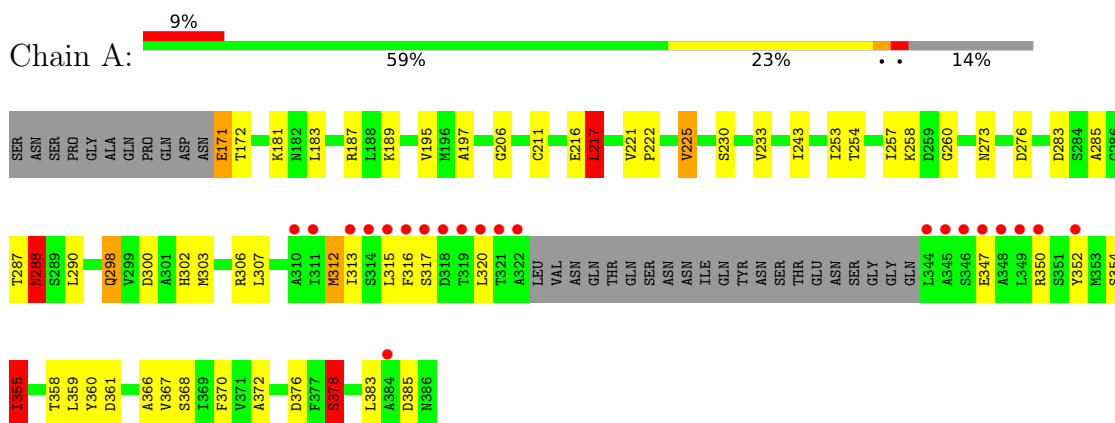
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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	V	63	Total O 63 63	0	0
6	W	26	Total O 26 26	0	0
6	X	7	Total O 7 7	0	0
6	Y	57	Total O 57 57	0	0
6	Z	21	Total O 21 21	0	0
6	a	8	Total O 8 8	0	0
6	b	59	Total O 59 59	0	0
6	c	31	Total O 31 31	0	0
6	d	3	Total O 3 3	0	0
6	e	52	Total O 52 52	0	0
6	f	28	Total O 28 28	0	0
6	g	4	Total O 4 4	0	0
6	h	50	Total O 50 50	0	0
6	i	21	Total O 21 21	0	0
6	j	11	Total O 11 11	0	0
6	k	56	Total O 56 56	0	0
6	l	37	Total O 37 37	0	0
6	m	8	Total O 8 8	0	0
6	n	50	Total O 50 50	0	0
6	o	35	Total O 35 35	0	0
6	p	12	Total O 12 12	0	0

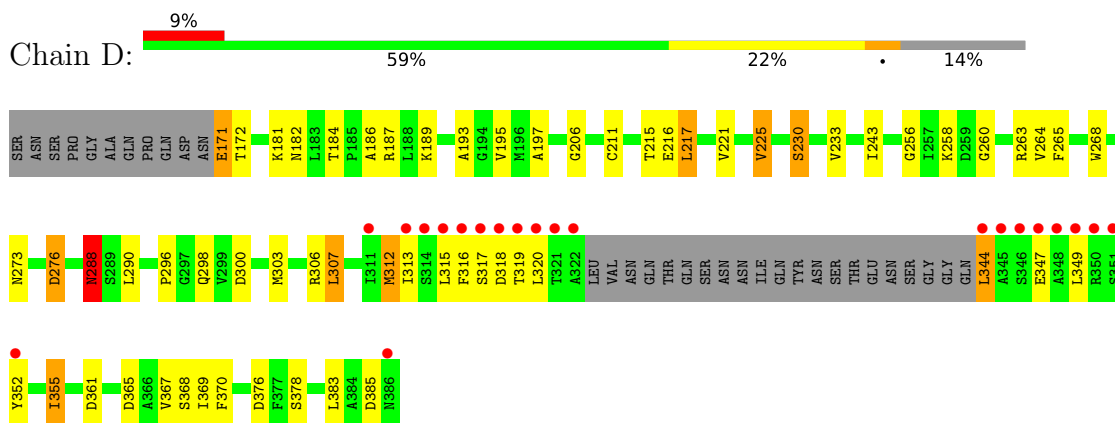
3 Residue-property plots [i](#)

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.

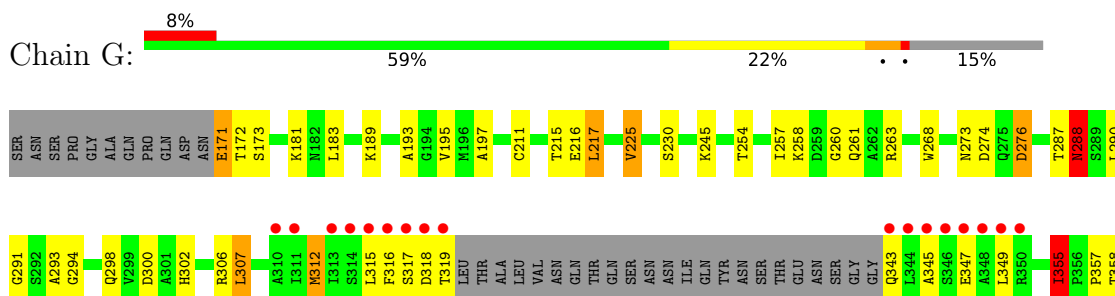
- Molecule 1: TraF protein

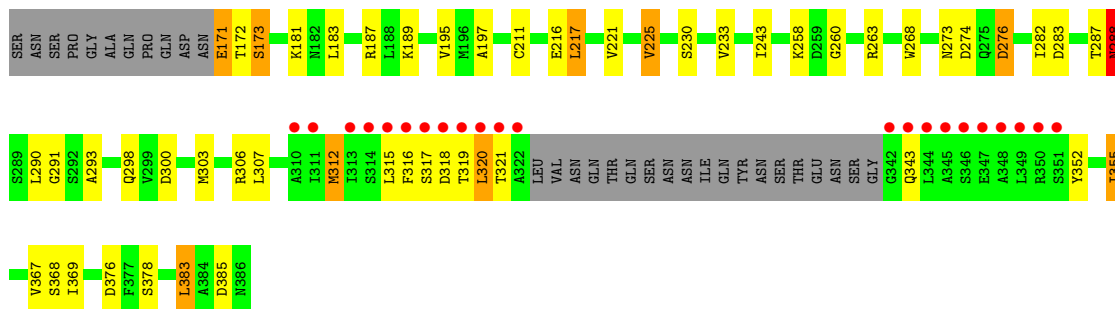


- Molecule 1: TraF protein

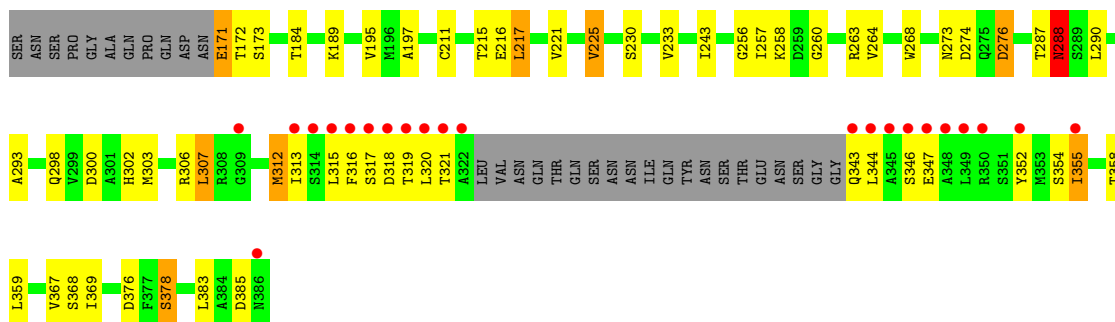


- Molecule 1: TraF protein

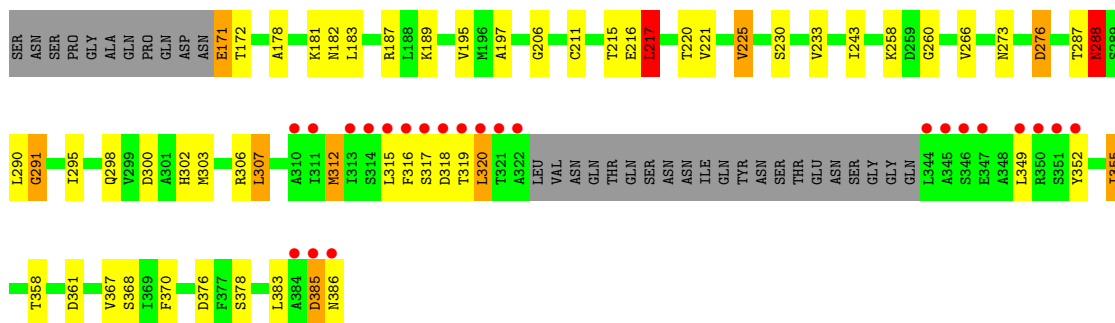




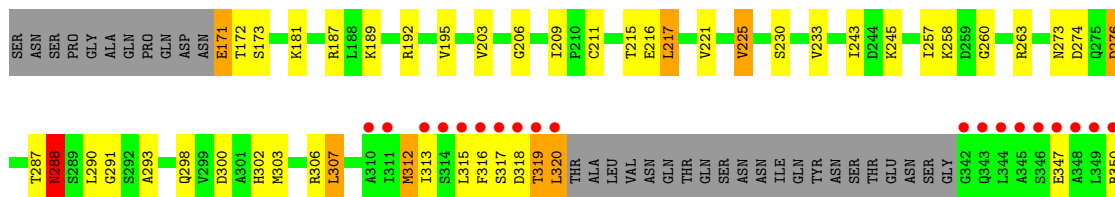
• Molecule 1: TraF protein



• Molecule 1: TraF protein

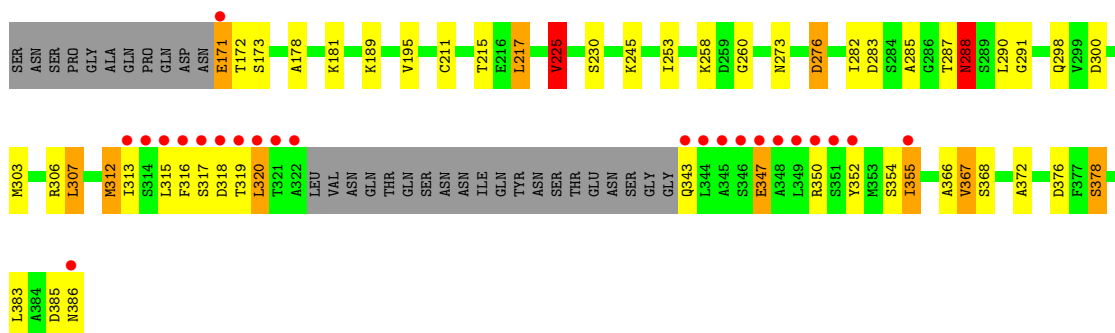


• Molecule 1: TraF protein

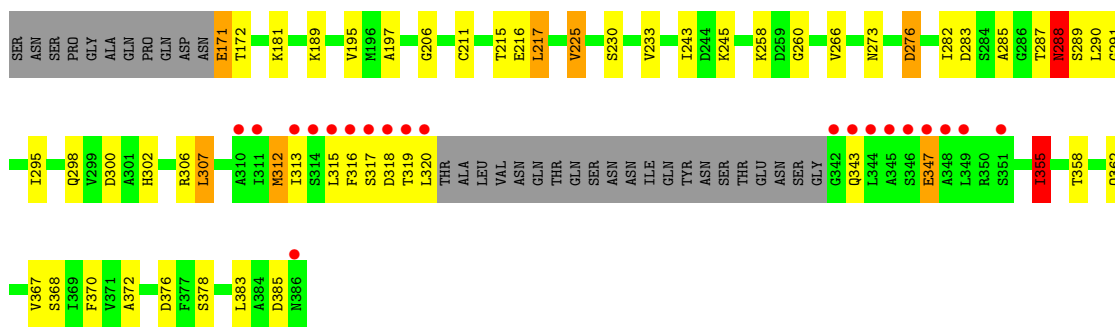




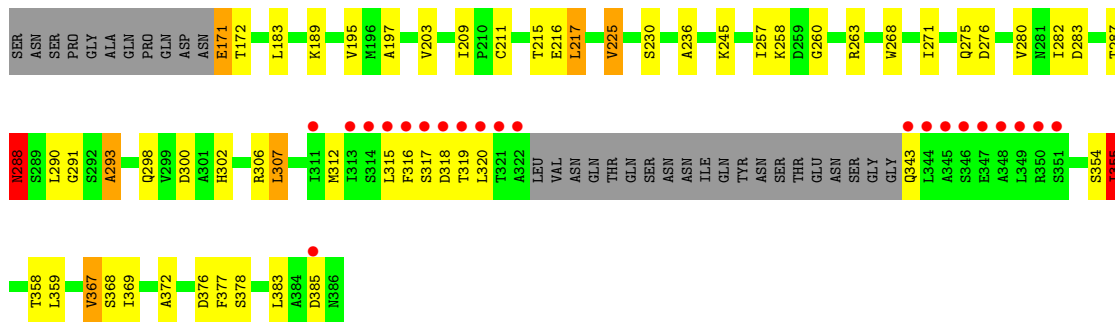
- Molecule 1: TraF protein



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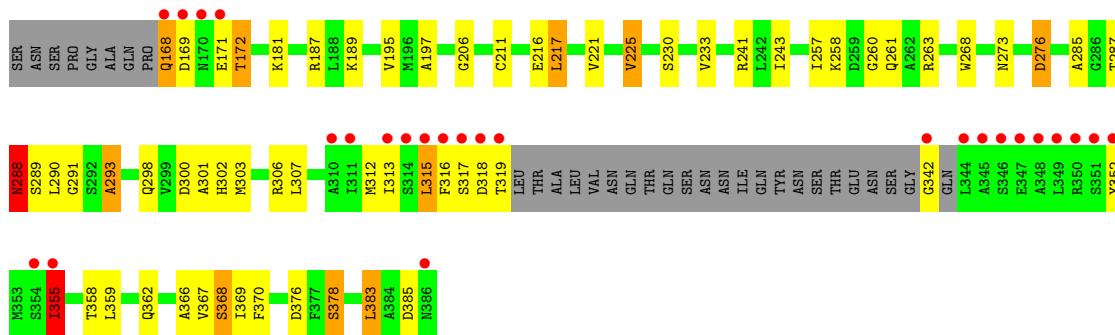


- Molecule 1: TraF protein

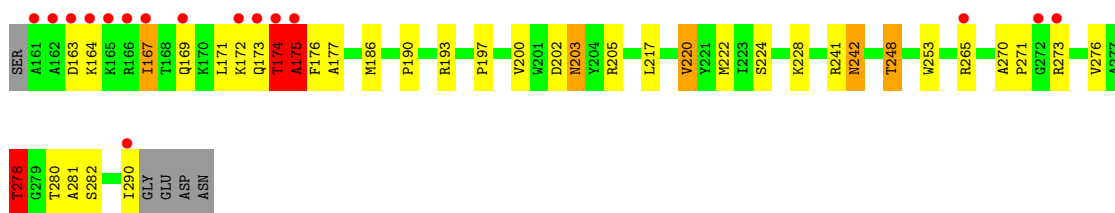


- Molecule 1: TraF protein

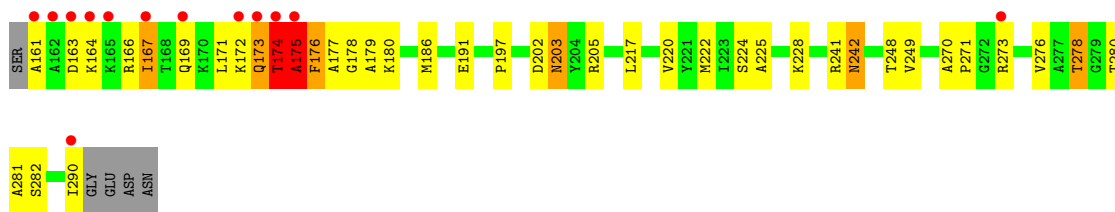




• Molecule 2: TraO protein



• Molecule 2: TraO protein

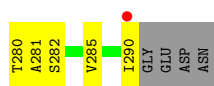


• Molecule 2: TraO protein

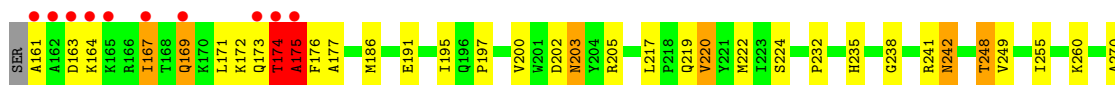


• Molecule 2: TraO protein

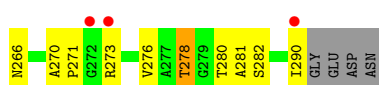




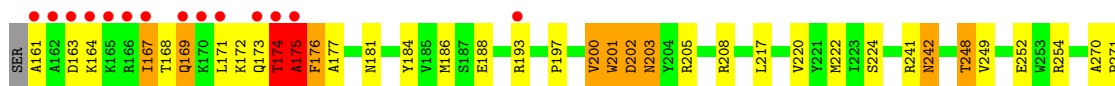
• Molecule 2: TraO protein



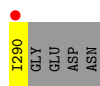
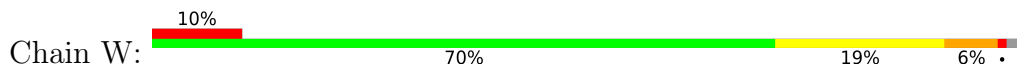
• Molecule 2: TraO protein



• Molecule 2: TraO protein

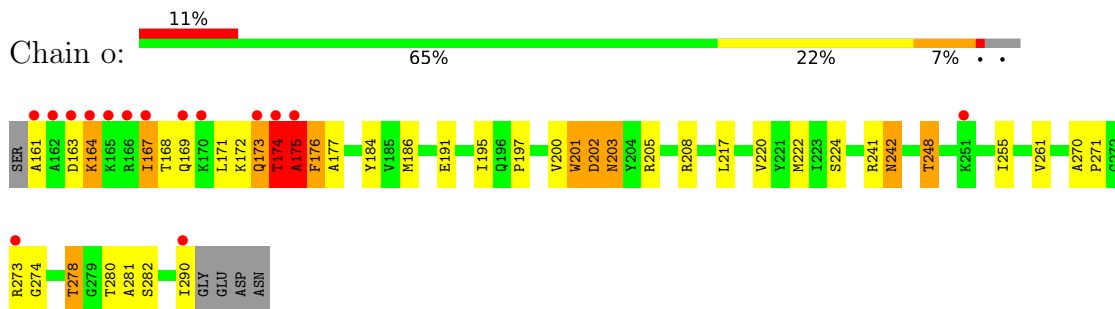


• Molecule 2: TraO protein

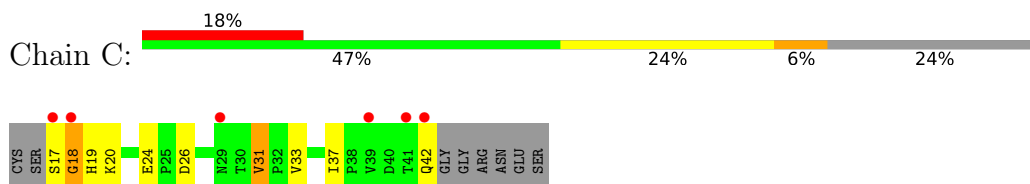


• Molecule 2: TraO protein

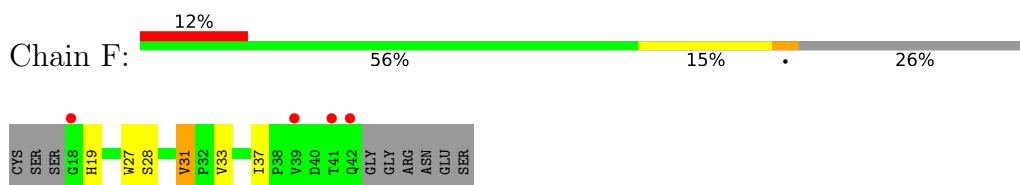
- Molecule 2: TraO protein



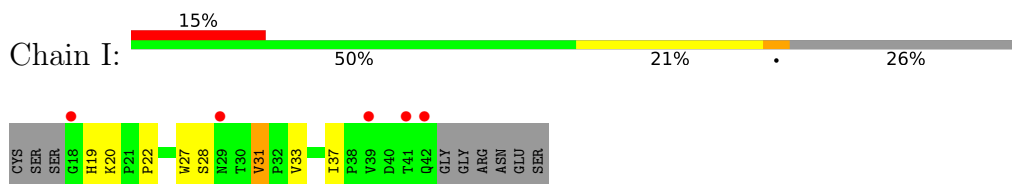
- Molecule 3: TraN protein



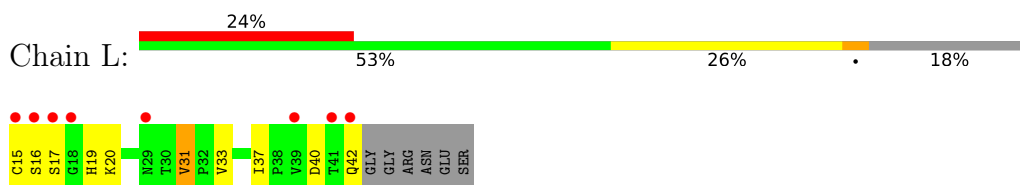
- Molecule 3: TraN protein



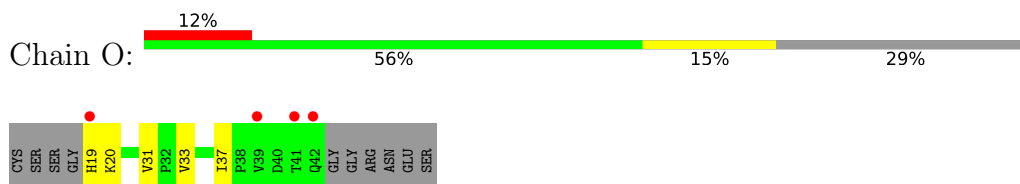
- Molecule 3: TraN protein



- Molecule 3: TraN protein



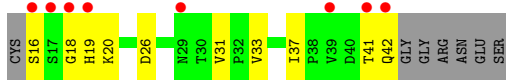
- Molecule 3: TraN protein



- Molecule 3: TraN protein



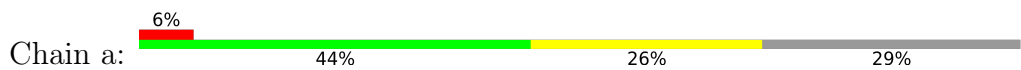
- Molecule 3: TraN protein



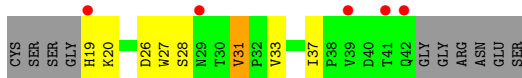
- Molecule 3: TraN protein



- Molecule 3: TraN protein



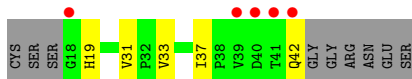
- Molecule 3: TraN protein



- Molecule 3: TraN protein



- Molecule 3: TraN protein



● Molecule 3: TraN protein



● Molecule 3: TraN protein



4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	202.40Å 211.63Å 203.44Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	52.91 – 2.60 52.91 – 2.60	Depositor EDS
% Data completeness (in resolution range)	95.5 (52.91-2.60) 97.2 (52.91-2.60)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.10 (at 2.61Å)	Xtriage
Refinement program	REFMAC 5.5.0072	Depositor
R, R_{free}	0.227 , 0.259 0.206 , 0.231	Depositor DCC
R_{free} test set	12939 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	34.8	Xtriage
Anisotropy	0.096	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 45.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.012 for -h,l,k 0.010 for -k,-h,-l 0.011 for l,-k,h 0.003 for l,h,k 0.003 for k,l,h	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	38842	wwPDB-VP
Average B, all atoms (Å ²)	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.12% 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: MPD, LDA

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	1.20	4/1464 (0.3%)	1.25	7/1978 (0.4%)
1	D	1.21	3/1464 (0.2%)	1.27	10/1978 (0.5%)
1	G	1.18	4/1453 (0.3%)	1.23	7/1962 (0.4%)
1	J	1.20	5/1473 (0.3%)	1.24	9/1990 (0.5%)
1	M	1.17	2/1477 (0.1%)	1.25	11/1995 (0.6%)
1	P	1.14	1/1477 (0.1%)	1.24	8/1995 (0.4%)
1	S	1.16	1/1477 (0.1%)	1.24	7/1995 (0.4%)
1	V	1.17	3/1473 (0.2%)	1.22	9/1990 (0.5%)
1	Y	1.20	4/1464 (0.3%)	1.26	9/1978 (0.5%)
1	b	1.22	3/1465 (0.2%)	1.26	7/1978 (0.4%)
1	e	1.19	5/1473 (0.3%)	1.24	8/1990 (0.4%)
1	h	1.21	4/1455 (0.3%)	1.28	8/1966 (0.4%)
1	k	1.20	6/1473 (0.4%)	1.24	11/1990 (0.6%)
1	n	1.22	7/1472 (0.5%)	1.27	11/1986 (0.6%)
2	B	1.17	1/1051 (0.1%)	1.27	10/1417 (0.7%)
2	E	1.14	1/1051 (0.1%)	1.27	10/1417 (0.7%)
2	H	1.30	2/1051 (0.2%)	1.29	10/1417 (0.7%)
2	K	1.13	0/1051	1.29	10/1417 (0.7%)
2	N	1.08	0/1051	1.28	13/1417 (0.9%)
2	Q	1.11	0/1051	1.30	12/1417 (0.8%)
2	T	1.15	2/1051 (0.2%)	1.27	8/1417 (0.6%)
2	W	1.13	0/1051	1.24	9/1417 (0.6%)
2	Z	1.09	0/1051	1.27	11/1417 (0.8%)
2	c	1.11	0/1051	1.30	10/1417 (0.7%)
2	f	1.20	1/1051 (0.1%)	1.28	14/1417 (1.0%)
2	i	1.21	2/1051 (0.2%)	1.25	10/1417 (0.7%)
2	l	1.14	0/1051	1.28	11/1417 (0.8%)
2	o	1.19	1/1050 (0.1%)	1.28	10/1415 (0.7%)
3	C	1.21	0/208	1.23	4/289 (1.4%)
3	F	1.02	0/202	1.06	1/281 (0.4%)
3	I	1.03	0/202	1.05	2/281 (0.7%)
3	L	0.98	0/220	1.26	2/305 (0.7%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
3	O	0.88	0/198	1.09	0/276
3	R	1.04	0/193	1.15	2/269 (0.7%)
3	U	1.09	0/214	1.24	0/297
3	X	0.96	0/198	1.08	0/276
3	a	0.93	0/198	1.06	0/276
3	d	1.06	0/198	1.11	1/276 (0.4%)
3	g	1.10	0/202	1.18	2/281 (0.7%)
3	j	1.09	0/202	1.07	0/281
3	m	1.10	0/202	1.09	0/281
3	p	1.04	0/189	1.17	0/264
All	All	1.17	62/38099 (0.2%)	1.25	284/51540 (0.6%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	G	0	1
1	J	0	1
1	M	0	1
1	P	0	2
1	S	0	1
1	V	0	1
1	Y	0	1
1	b	0	1
1	e	0	1
1	h	0	1
1	k	0	1
1	n	0	1
2	B	0	2
2	E	0	2
2	H	0	2
2	K	0	2
2	N	0	2
2	Q	0	2
2	T	0	2
2	W	0	2
2	Z	0	2
2	c	0	2
2	f	0	2

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Mol	Chain	#Chirality outliers	#Planarity outliers
2	i	0	2
2	l	0	2
2	o	0	2
3	U	0	1
All	All	0	43

The worst 5 of 62 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	e	298	GLN	CD-NE2	-9.94	1.12	1.33
1	e	298	GLN	CD-OE1	-9.17	1.06	1.23
1	A	298	GLN	CD-OE1	-9.16	1.06	1.23
1	A	298	GLN	CD-NE2	-7.77	1.17	1.33
1	b	221	VAL	CA-CB	-7.67	1.48	1.54

The worst 5 of 284 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	l	176	PHE	N-CA-C	-11.18	97.50	112.26
2	Q	176	PHE	N-CA-C	-10.75	98.07	112.26
2	H	176	PHE	N-CA-C	-10.20	98.80	112.26
2	c	176	PHE	N-CA-C	-10.09	98.94	112.26
2	f	176	PHE	N-CA-C	-9.87	99.24	112.26

There are no chirality outliers.

5 of 43 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	287	THR	Peptide
2	B	174	THR	Peptide
2	B	175	ALA	Peptide
2	E	174	THR	Peptide
2	E	175	ALA	Peptide

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	1448	0	1434	58	0
1	D	1448	0	1434	59	0
1	G	1437	0	1419	51	0
1	J	1457	0	1441	67	0
1	M	1461	0	1445	59	0
1	P	1461	0	1445	57	0
1	S	1461	0	1445	51	0
1	V	1457	0	1442	51	0
1	Y	1448	0	1434	49	0
1	b	1449	0	1433	58	0
1	e	1457	0	1442	50	0
1	h	1439	0	1416	48	0
1	k	1457	0	1442	47	0
1	n	1457	0	1431	49	0
2	B	1033	0	1032	32	0
2	E	1033	0	1032	34	0
2	H	1033	0	1032	40	0
2	K	1033	0	1032	37	0
2	N	1033	0	1032	36	0
2	Q	1033	0	1032	33	0
2	T	1033	0	1032	38	1
2	W	1033	0	1032	36	0
2	Z	1033	0	1032	37	0
2	c	1033	0	1032	34	0
2	f	1033	0	1032	34	0
2	i	1033	0	1032	35	0
2	l	1033	0	1032	35	0
2	o	1032	0	1028	42	0
3	C	200	0	190	15	0
3	F	194	0	185	7	0
3	I	194	0	185	12	1
3	L	212	0	200	11	0
3	O	190	0	182	9	0
3	R	185	0	177	11	0
3	U	206	0	195	15	0
3	X	190	0	182	13	0
3	a	190	0	182	11	0
3	d	190	0	182	12	0
3	g	194	0	185	15	0
3	j	194	0	185	9	0
3	m	194	0	185	12	0
3	p	181	0	174	10	0
4	D	8	0	14	5	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	h	8	0	14	1	0
4	k	8	0	14	1	0
5	J	16	0	31	34	0
6	A	65	0	0	5	0
6	B	31	0	0	1	0
6	C	7	0	0	1	0
6	D	65	0	0	2	0
6	E	28	0	0	2	0
6	F	9	0	0	0	0
6	G	50	0	0	1	0
6	H	22	0	0	2	0
6	I	9	0	0	0	0
6	J	49	0	0	0	0
6	K	30	0	0	3	0
6	L	12	0	0	0	0
6	M	48	0	0	1	0
6	N	35	0	0	3	0
6	O	11	0	0	0	0
6	P	58	0	0	3	0
6	Q	27	0	0	2	0
6	R	7	0	0	0	0
6	S	57	0	0	0	0
6	T	21	0	0	0	0
6	U	10	0	0	1	0
6	V	63	0	0	1	0
6	W	26	0	0	1	0
6	X	7	0	0	1	0
6	Y	57	0	0	2	0
6	Z	21	0	0	2	0
6	a	8	0	0	0	0
6	b	59	0	0	2	0
6	c	31	0	0	2	0
6	d	3	0	0	0	0
6	e	52	0	0	4	0
6	f	28	0	0	2	0
6	g	4	0	0	1	0
6	h	50	0	0	3	0
6	i	21	0	0	1	0
6	j	11	0	0	0	0
6	k	56	0	0	3	0
6	l	37	0	0	2	0
6	m	8	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	n	50	0	0	5	0
6	o	35	0	0	3	0
6	p	12	0	0	0	0
All	All	38842	0	37209	1128	1

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 15.

The worst 5 of 1128 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:350:ARG:HD3	6:A:1064:HOH:O	1.43	1.16
1:M:347:GLU:HG3	1:P:349:LEU:HD23	1.24	1.12
1:J:178:ALA:HB3	5:J:1:LDA:HM11	1.12	1.11
1:J:175:GLY:O	5:J:1:LDA:CM1	1.99	1.10
1:A:347:GLU:HG3	1:D:349:LEU:HD23	1.11	1.06

All (1) 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)
3:I:27:TRP:CB	2:T:193:ARG:NH1[4_444]	1.66	0.54

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	191/227 (84%)	179 (94%)	10 (5%)	2 (1%)	12 28
1	D	191/227 (84%)	177 (93%)	13 (7%)	1 (0%)	24 46
1	G	189/227 (83%)	176 (93%)	12 (6%)	1 (0%)	24 46

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	J	193/227 (85%)	178 (92%)	14 (7%)	1 (0%)	24	46
1	M	193/227 (85%)	178 (92%)	13 (7%)	2 (1%)	12	28
1	P	193/227 (85%)	179 (93%)	13 (7%)	1 (0%)	24	46
1	S	193/227 (85%)	179 (93%)	13 (7%)	1 (0%)	24	46
1	V	192/227 (85%)	179 (93%)	12 (6%)	1 (0%)	24	46
1	Y	191/227 (84%)	179 (94%)	11 (6%)	1 (0%)	24	46
1	b	191/227 (84%)	176 (92%)	13 (7%)	2 (1%)	12	28
1	e	192/227 (85%)	180 (94%)	10 (5%)	2 (1%)	12	28
1	h	191/227 (84%)	179 (94%)	11 (6%)	1 (0%)	24	46
1	k	192/227 (85%)	180 (94%)	11 (6%)	1 (0%)	24	46
1	n	191/227 (84%)	178 (93%)	12 (6%)	1 (0%)	24	46
2	B	128/135 (95%)	118 (92%)	10 (8%)	0	100	100
2	E	128/135 (95%)	120 (94%)	7 (6%)	1 (1%)	16	34
2	H	128/135 (95%)	118 (92%)	9 (7%)	1 (1%)	16	34
2	K	128/135 (95%)	119 (93%)	9 (7%)	0	100	100
2	N	128/135 (95%)	121 (94%)	7 (6%)	0	100	100
2	Q	128/135 (95%)	120 (94%)	7 (6%)	1 (1%)	16	34
2	T	128/135 (95%)	120 (94%)	8 (6%)	0	100	100
2	W	128/135 (95%)	122 (95%)	5 (4%)	1 (1%)	16	34
2	Z	128/135 (95%)	118 (92%)	9 (7%)	1 (1%)	16	34
2	c	128/135 (95%)	119 (93%)	8 (6%)	1 (1%)	16	34
2	f	128/135 (95%)	120 (94%)	7 (6%)	1 (1%)	16	34
2	i	128/135 (95%)	120 (94%)	7 (6%)	1 (1%)	16	34
2	l	128/135 (95%)	120 (94%)	7 (6%)	1 (1%)	16	34
2	o	128/135 (95%)	120 (94%)	7 (6%)	1 (1%)	16	34
3	C	24/34 (71%)	23 (96%)	1 (4%)	0	100	100
3	F	23/34 (68%)	22 (96%)	1 (4%)	0	100	100
3	I	23/34 (68%)	22 (96%)	1 (4%)	0	100	100
3	L	26/34 (76%)	24 (92%)	1 (4%)	1 (4%)	2	3
3	O	22/34 (65%)	21 (96%)	1 (4%)	0	100	100
3	R	22/34 (65%)	21 (96%)	1 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	U	25/34 (74%)	24 (96%)	1 (4%)	0	100	100
3	X	22/34 (65%)	21 (96%)	1 (4%)	0	100	100
3	a	22/34 (65%)	20 (91%)	2 (9%)	0	100	100
3	d	22/34 (65%)	20 (91%)	2 (9%)	0	100	100
3	g	23/34 (68%)	21 (91%)	2 (9%)	0	100	100
3	j	23/34 (68%)	21 (91%)	2 (9%)	0	100	100
3	m	23/34 (68%)	22 (96%)	1 (4%)	0	100	100
3	p	21/34 (62%)	21 (100%)	0	0	100	100
All	All	4796/5544 (86%)	4475 (93%)	292 (6%)	29 (1%)	21	42

5 of 29 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	288	ASN
1	D	288	ASN
1	G	288	ASN
3	L	17	SER
1	M	288	ASN

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	157/180 (87%)	140 (89%)	17 (11%)	6	13
1	D	157/180 (87%)	140 (89%)	17 (11%)	6	13
1	G	156/180 (87%)	140 (90%)	16 (10%)	7	15
1	J	157/180 (87%)	138 (88%)	19 (12%)	5	10
1	M	158/180 (88%)	140 (89%)	18 (11%)	5	11
1	P	158/180 (88%)	140 (89%)	18 (11%)	5	11
1	S	158/180 (88%)	140 (89%)	18 (11%)	5	11
1	V	158/180 (88%)	139 (88%)	19 (12%)	5	10

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	Y	157/180 (87%)	141 (90%)	16 (10%)	7	15
1	b	157/180 (87%)	140 (89%)	17 (11%)	6	13
1	e	158/180 (88%)	138 (87%)	20 (13%)	4	9
1	h	155/180 (86%)	138 (89%)	17 (11%)	6	13
1	k	158/180 (88%)	142 (90%)	16 (10%)	7	15
1	n	158/180 (88%)	141 (89%)	17 (11%)	6	13
2	B	109/110 (99%)	96 (88%)	13 (12%)	5	10
2	E	109/110 (99%)	94 (86%)	15 (14%)	3	7
2	H	109/110 (99%)	96 (88%)	13 (12%)	5	10
2	K	109/110 (99%)	97 (89%)	12 (11%)	6	13
2	N	109/110 (99%)	94 (86%)	15 (14%)	3	7
2	Q	109/110 (99%)	94 (86%)	15 (14%)	3	7
2	T	109/110 (99%)	94 (86%)	15 (14%)	3	7
2	W	109/110 (99%)	96 (88%)	13 (12%)	5	10
2	Z	109/110 (99%)	96 (88%)	13 (12%)	5	10
2	c	109/110 (99%)	95 (87%)	14 (13%)	4	8
2	f	109/110 (99%)	96 (88%)	13 (12%)	5	10
2	i	109/110 (99%)	97 (89%)	12 (11%)	6	13
2	l	109/110 (99%)	95 (87%)	14 (13%)	4	8
2	o	108/110 (98%)	94 (87%)	14 (13%)	4	8
3	C	25/31 (81%)	22 (88%)	3 (12%)	5	10
3	F	24/31 (77%)	22 (92%)	2 (8%)	10	23
3	I	24/31 (77%)	22 (92%)	2 (8%)	10	23
3	L	27/31 (87%)	24 (89%)	3 (11%)	6	12
3	O	24/31 (77%)	22 (92%)	2 (8%)	10	23
3	R	23/31 (74%)	21 (91%)	2 (9%)	9	21
3	U	26/31 (84%)	24 (92%)	2 (8%)	12	27
3	X	24/31 (77%)	21 (88%)	3 (12%)	4	9
3	a	24/31 (77%)	22 (92%)	2 (8%)	10	23
3	d	24/31 (77%)	22 (92%)	2 (8%)	10	23
3	g	24/31 (77%)	22 (92%)	2 (8%)	10	23

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	j	24/31 (77%)	22 (92%)	2 (8%)	10	23
3	m	24/31 (77%)	22 (92%)	2 (8%)	10	23
3	p	23/31 (74%)	21 (91%)	2 (9%)	9	21
All	All	4067/4494 (90%)	3600 (88%)	467 (12%)	5	11

5 of 467 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	T	248	THR
1	n	307	LEU
1	Y	383	LEU
1	n	211	CYS
2	i	290	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 115 such sidechains are listed below:

Mol	Chain	Res	Type
2	W	169	GLN
2	o	169	GLN
3	a	19	HIS
1	n	302	HIS
1	k	298	GLN

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

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
5	LDA	J	1	-	13,15,15	2.50	2 (15%)	14,17,17	1.17	2 (14%)
4	MPD	k	3	-	7,7,7	0.32	0	9,10,10	0.95	0
4	MPD	h	2	-	7,7,7	0.20	0	9,10,10	0.81	0
4	MPD	D	1	-	7,7,7	0.25	0	9,10,10	0.57	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	LDA	J	1	-	-	11/13/13/13	-
4	MPD	k	3	-	-	0/5/5/5	-
4	MPD	h	2	-	-	3/5/5/5	-
4	MPD	D	1	-	-	5/5/5/5	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	J	1	LDA	O1-N1	-7.70	1.23	1.42
5	J	1	LDA	C1-N1	-4.24	1.47	1.51

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	J	1	LDA	CM2-N1-C1	3.17	116.89	110.23
5	J	1	LDA	C12-C11-C10	2.17	128.01	113.36

There are no chirality outliers.

5 of 19 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	D	1	MPD	C2-C3-C4-O4
4	D	1	MPD	C2-C3-C4-C5
5	J	1	LDA	C2-C1-N1-O1
5	J	1	LDA	C2-C1-N1-CM1
5	J	1	LDA	C2-C1-N1-CM2

There are no ring outliers.

4 monomers are involved in 41 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	J	1	LDA	34	0
4	k	3	MPD	1	0
4	h	2	MPD	1	0
4	D	1	MPD	5	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 [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	190/227 (83%)	0.14	21 (11%) 10 8	19, 27, 76, 95	0
1	D	190/227 (83%)	0.20	21 (11%) 10 8	19, 27, 76, 96	0
1	G	188/227 (82%)	0.02	19 (10%) 12 9	19, 27, 74, 87	0
1	J	192/227 (84%)	0.20	24 (12%) 8 6	19, 27, 76, 97	0
1	M	192/227 (84%)	0.16	24 (12%) 8 6	19, 27, 77, 93	0
1	P	192/227 (84%)	0.20	25 (13%) 7 5	19, 27, 77, 97	0
1	S	192/227 (84%)	0.19	22 (11%) 9 7	19, 27, 77, 95	0
1	V	191/227 (84%)	0.13	22 (11%) 9 7	19, 27, 77, 95	0
1	Y	190/227 (83%)	0.12	23 (12%) 8 6	19, 27, 76, 95	0
1	b	190/227 (83%)	0.12	20 (10%) 11 9	19, 27, 76, 90	0
1	e	191/227 (84%)	0.19	23 (12%) 9 7	19, 27, 76, 97	0
1	h	190/227 (83%)	0.17	20 (10%) 11 9	19, 27, 76, 89	0
1	k	191/227 (84%)	0.17	21 (10%) 10 8	19, 27, 77, 98	0
1	n	191/227 (84%)	0.18	26 (13%) 7 5	19, 27, 75, 126	0
2	B	127/135 (94%)	0.25	16 (12%) 8 6	24, 33, 68, 93	0
2	E	127/135 (94%)	0.16	13 (10%) 12 9	24, 33, 68, 93	0
2	H	127/135 (94%)	0.19	14 (11%) 10 8	24, 33, 68, 93	0
2	K	127/135 (94%)	0.23	16 (12%) 8 6	24, 33, 68, 93	0
2	N	127/135 (94%)	0.11	13 (10%) 12 9	24, 33, 68, 93	0
2	Q	127/135 (94%)	0.18	14 (11%) 10 8	24, 33, 68, 93	0
2	T	127/135 (94%)	0.24	16 (12%) 8 6	24, 33, 68, 93	0
2	W	127/135 (94%)	0.12	13 (10%) 12 9	24, 33, 68, 93	0
2	Z	127/135 (94%)	0.16	11 (8%) 16 12	24, 33, 68, 93	0
2	c	127/135 (94%)	0.08	13 (10%) 12 9	24, 33, 68, 93	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
2	f	127/135 (94%)	0.21	16 (12%) 8 6	24, 33, 68, 93	0
2	i	127/135 (94%)	0.15	13 (10%) 12 9	24, 33, 68, 93	0
2	l	127/135 (94%)	0.20	15 (11%) 9 7	24, 33, 68, 93	0
2	o	127/135 (94%)	0.31	15 (11%) 9 7	24, 33, 68, 93	0
3	C	26/34 (76%)	1.32	6 (23%) 2 1	30, 40, 76, 83	0
3	F	25/34 (73%)	0.65	4 (16%) 5 4	31, 37, 76, 84	0
3	I	25/34 (73%)	0.90	5 (20%) 3 2	30, 37, 76, 82	0
3	L	28/34 (82%)	0.93	8 (28%) 1 1	30, 41, 79, 82	0
3	O	24/34 (70%)	0.66	4 (16%) 4 3	30, 37, 76, 85	0
3	R	24/34 (70%)	0.50	3 (12%) 8 6	30, 37, 69, 81	0
3	U	27/34 (79%)	1.47	8 (29%) 1 1	30, 40, 76, 84	0
3	X	24/34 (70%)	0.59	4 (16%) 4 3	30, 37, 76, 84	0
3	a	24/34 (70%)	0.34	2 (8%) 17 13	31, 37, 76, 83	0
3	d	24/34 (70%)	0.65	5 (20%) 2 2	30, 37, 76, 85	0
3	g	25/34 (73%)	0.67	3 (12%) 9 7	30, 37, 76, 86	0
3	j	25/34 (73%)	0.64	5 (20%) 3 2	30, 37, 76, 84	0
3	m	25/34 (73%)	0.61	4 (16%) 5 4	30, 37, 76, 84	0
3	p	23/34 (67%)	0.79	2 (8%) 16 12	30, 37, 69, 81	0
All	All	4797/5544 (86%)	0.21	572 (11%) 9 7	19, 31, 77, 126	0

The worst 5 of 572 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	e	316	PHE	10.5
1	n	342	GLY	10.2
1	A	345	ALA	9.0
1	D	345	ALA	8.9
1	h	343	GLN	8.6

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
5	LDA	J	1	16/16	0.73	0.23	11,42,48,52	0
4	MPD	D	1	8/8	0.88	0.23	62,63,64,67	0
4	MPD	k	3	8/8	0.89	0.17	44,45,48,53	0
4	MPD	h	2	8/8	0.91	0.17	50,52,56,59	0

6.5 Other polymers [i](#)

There are no such residues in this entry.