W O R L D W I D E
wwPDB
P R O T E I N   D A T A   B A N K

wwPDB X-ray Structure Validation Summary Report (i)

Dec 9, 2023 – 10:49 pm GMT

PDB ID	:	1E8O
Title	:	Core of the Alu domain of the mammalian SRP
Authors	:	Weichenrieder, O.; Wild, K.; Strub, K.; Cusack, S.
Deposited on	:	2000-09-28
Resolution	:	3.20 Å(reported)

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

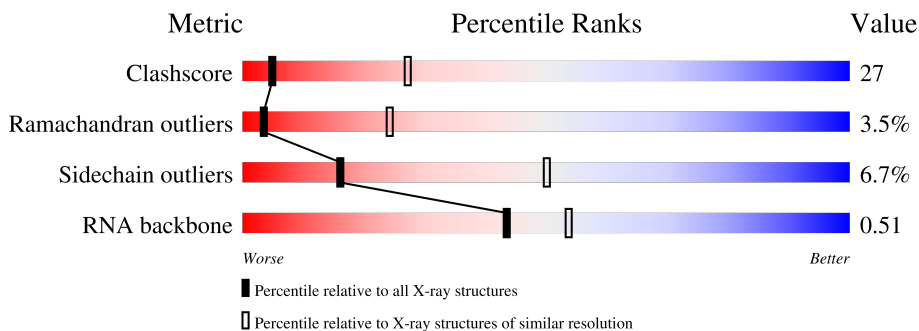|		
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 3.20 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	Percentile Ranks	Value
Clashscore		27
Ramachandran outliers		3.5%
Sidechain outliers		6.7%
RNA backbone		0.51

Worse   *Better*

▌ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	1253 (3.20-3.20)
Ramachandran outliers	138981	1234 (3.20-3.20)
Sidechain outliers	138945	1233 (3.20-3.20)
RNA backbone	3102	1010 (3.50-2.90)

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%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	85	48% 36% • 13%
1	C	85	32% 44% 7% • 16%
2	B	106	40% 26% 5% 29%
2	D	106	42% 25% • 28%
3	E	50	26% 58% 10% 6%

2 Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 3508 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 SIGNAL RECOGNITION PARTICLE 9 KDA PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	74	Total	C	N	O	S	0	0	0
			608	388	105	110	5			
1	C	71	Total	C	N	O	S	0	0	0
			580	369	101	105	5			

- Molecule 2 is a protein called SIGNAL RECOGNITION PARTICLE 14 KDA PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	75	Total	C	N	O	S	0	0	0
			600	380	104	112	4			
2	D	76	Total	C	N	O	S	0	0	0
			604	382	105	113	4			

- Molecule 3 is a RNA chain called 7SL RNA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	E	50	Total	C	N	O	P	0	0	0
			1079	476	195	357	51			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	99	GDP	G	cloning artifact	EMBL X01037
E	100	G	C	cloning artifact	EMBL X01037
E	119	C	U	engineered mutation	EMBL X01037
E	148	C	G	cloning artifact	EMBL X01037

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O_4S).

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

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total 1	O 1	0	0
5	B	2	Total 2	O 2	0	0
5	C	1	Total 1	O 1	0	0
5	D	3	Total 3	O 3	0	0
5	E	15	Total 15	O 15	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. 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. 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.
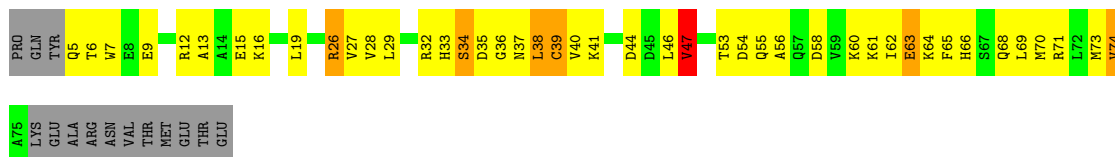
Note EDS was not executed.

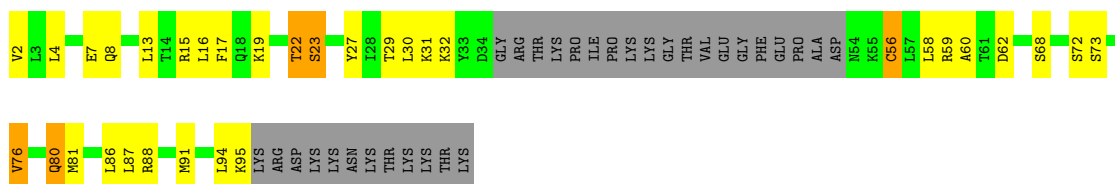• Molecule 1: SIGNAL RECOGNITION PARTICLE 9 KDA PROTEIN

Chain A:
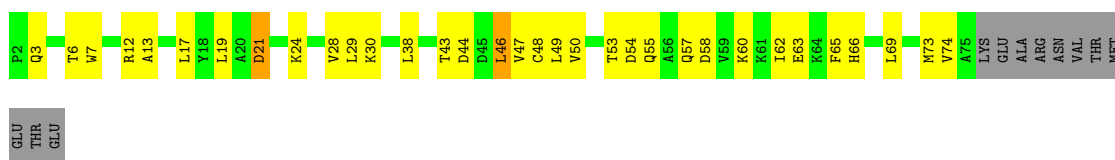
• Molecule 1: SIGNAL RECOGNITION PARTICLE 9 KDA PROTEIN

Chain C:

• Molecule 2: SIGNAL RECOGNITION PARTICLE 14 KDA PROTEIN

Chain B:

• Molecule 2: SIGNAL RECOGNITION PARTICLE 14 KDA PROTEIN

Chain D:
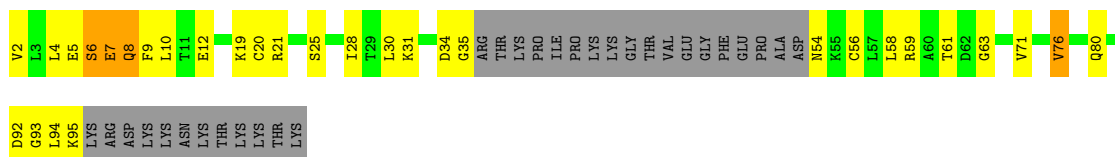
• Molecule 3: 7SL RNA

Chain E:

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                                              26%                              58%                  10%      6%
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G99 G100 G101 C102 C103 G104 G105 G106 C107 G108 C109 G110 G111 U112 G113 G114 C115 G116 C117 G118 C119 G120 C121 C122 U123 G124 U125 U128 C129 A132 G133 A136 C137 U138 C139 G140 G141 G142 A143 G144 G145 C146 U147 C148
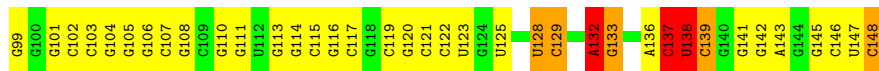
4 Data and refinement statistics (i)

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	57.45Å 186.62Å 189.82Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.46 – 3.20	Depositor
% Data completeness (in resolution range)	94.1 (47.46-3.20)	Depositor
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.245 , 0.291	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3508	wwPDB-VP
Average B, all atoms (Å^2)	57.0	wwPDB-VP

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: GDP, 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	0.50	0/619	0.75	0/832
1	C	0.42	0/589	0.66	0/791
2	B	0.50	0/604	0.74	0/804
2	D	0.39	0/608	0.65	0/809
3	E	0.57	0/1173	0.80	3/1829 (0.2%)
All	All	0.49	0/3593	0.74	3/5065 (0.1%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	E	138	U	N1-C1'-C2'	5.67	121.37	114.00
3	E	137	C	C2'-C3'-O3'	5.39	122.33	113.70
3	E	132	A	C5'-C4'-C3'	-5.28	107.55	116.00

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	608	0	619	43	0
1	C	580	0	594	59	0
2	B	600	0	635	37	1

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	604	0	638	33	0
3	E	1079	0	544	38	0
4	A	5	0	0	0	0
4	B	5	0	0	0	0
4	E	5	0	0	0	0
5	A	1	0	0	0	0
5	B	2	0	0	1	0
5	C	1	0	0	0	0
5	D	3	0	0	0	0
5	E	15	0	0	0	0
All	All	3508	0	3030	179	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 27.

The worst 5 of 179 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:38:LEU:HD12	1:C:39:CYS:H	1.17	1.04
1:A:53:THR:HG22	1:A:55:GLN:H	1.25	1.01
2:B:59:ARG:HG2	2:B:68:SER:HB3	1.44	0.99
1:C:28:VAL:HG22	1:C:41:LYS:HB3	1.44	0.98
1:A:28:VAL:HG12	2:B:29:THR:HG22	1.47	0.96

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)
2:B:7:GLU:OE1	2:B:7:GLU:OE1[3_655]	1.99	0.21

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	72/85 (85%)	61 (85%)	9 (12%)	2 (3%)	5	29
1	C	69/85 (81%)	57 (83%)	9 (13%)	3 (4%)	2	20
2	B	71/106 (67%)	61 (86%)	9 (13%)	1 (1%)	11	46
2	D	72/106 (68%)	63 (88%)	5 (7%)	4 (6%)	2	14
All	All	284/382 (74%)	242 (85%)	32 (11%)	10 (4%)	3	24

5 of 10 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	34	SER
1	C	47	VAL
2	D	6	SER
2	D	7	GLU
2	D	8	GLN

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	67/77 (87%)	64 (96%)	3 (4%)	27	63
1	C	64/77 (83%)	58 (91%)	6 (9%)	8	33
2	B	69/96 (72%)	63 (91%)	6 (9%)	10	37
2	D	69/96 (72%)	66 (96%)	3 (4%)	29	64
All	All	269/346 (78%)	251 (93%)	18 (7%)	16	50

5 of 18 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	74	VAL
2	D	76	VAL
2	D	54	ASN
2	B	80	GLN
1	C	63	GLU

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

Mol	Chain	Res	Type
1	A	66	HIS
1	A	68	GLN
2	B	85	ASN
2	D	85	ASN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
3	E	48/50 (96%)	11 (22%)	2 (4%)

5 of 11 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
3	E	101	G
3	E	104	G
3	E	128	U
3	E	129	C
3	E	132	A

All (2) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
3	E	136	A
3	E	137	C

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

1 non-standard protein/DNA/RNA residue is 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	GDP	E	99	3	24,30,30	1.09	2 (8%)	30,47,47	1.93	6 (20%)

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
3	GDP	E	99	3	-	5/12/32/32	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	E	99	GDP	C5-C6	-2.80	1.41	1.47
3	E	99	GDP	C8-N7	-2.54	1.30	1.35

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	E	99	GDP	O3B-PB-O3A	-7.19	80.52	104.64
3	E	99	GDP	O2B-PB-O3A	4.12	118.44	104.64
3	E	99	GDP	O3B-PB-O1B	-3.60	96.58	110.68
3	E	99	GDP	O2B-PB-O1B	2.83	121.78	110.68
3	E	99	GDP	O3B-PB-O2B	-2.70	97.33	107.64

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	E	99	GDP	C5'-O5'-PA-O3A
3	E	99	GDP	O4'-C4'-C5'-O5'
3	E	99	GDP	C5'-O5'-PA-O2A
3	E	99	GDP	C3'-C4'-C5'-O5'
3	E	99	GDP	PA-O3A-PB-O1B

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6   Ligand geometry (i)

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	$\#|Z| > 2$
4	SO4	A	1076	-	4,4,4	0.48	0	6,6,6	0.15	0
4	SO4	B	1002	-	4,4,4	0.48	0	6,6,6	0.15	0
4	SO4	E	1149	-	4,4,4	0.41	0	6,6,6	0.21	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 (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 ⓘ

6.1 Protein, DNA and RNA chains ⓘ

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates ⓘ

EDS was not executed - this section is therefore empty.

6.4 Ligands ⓘ

EDS was not executed - this section is therefore empty.

6.5 Other polymers ⓘ

EDS was not executed - this section is therefore empty.