



wwPDB X-ray Structure Validation Summary Report

Feb 27, 2014 – 02:00 PM GMT

PDB ID : 486D
Title : X-RAY CRYSTAL STRUCTURES OF 70S RIBOSOME FUNCTIONAL COMPLEXES
Authors : Cate, J.H.; Yusupov, M.M.; Yusupova, G.Zh.; Earnest, T.N.; Noller, H.F.
Deposited on : 1999-09-09
Resolution : 7.50 Å(reported)

This is a wwPDB validation summary report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

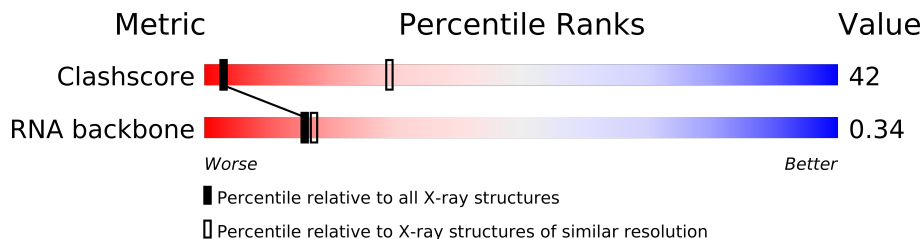
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 21963
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

The reported resolution of this entry is 7.50 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))
Clashscore	79885	1039 (10.00-3.52)
RNA backbone	1838	1055 (11.50-2.80)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	74	
2	B	3	
3	C	72	
4	D	3	
5	E	72	
6	F	85	
7	G	33	

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 4934 atoms, of which 0 are hydrogen and 0 are deuterium.

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 RNA chain called P-SITE TRNA OF 70S RIBOSOME.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	74	Total	C	N	O	P	0	0	0
			1603	722	283	524	74			

- Molecule 2 is a RNA chain called P-SITE CODON OF 70S RIBOSOME.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	3	Total	C	N	O	P	0	0	0
			60	27	6	24	3			

- Molecule 3 is a RNA chain called A-SITE TRNA OF 70S RIBOSOME.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	72	Total	C	N	O	P	0	0	0
			1546	692	270	512	72			

- Molecule 4 is a RNA chain called A-SITE CODON OF 70S RIBOSOME.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	3	Total	C	N	O	P	0	0	0
			63	28	10	22	3			

- Molecule 5 is a RNA chain called E-SITE TRNA OF 70S RIBOSOME.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	E	72	Total	C	N	O	P	0	0	0
			1540	687	269	512	72			

- Molecule 6 is a RNA chain called PENULTIMATE STEM OF 16S RRNA IN THE 70S RIBOSOME.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf	Trace
6	F	85	Total	P	0	0	85
			85	85			

- Molecule 7 is a RNA chain called 900 STEM-LOOP OF 16S RRNA IN THE 70S RIBOSOME.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf	Trace
7	G	33	Total	P	0	0	33
			33	33			

- Molecule 8 is IRIDIUM ION (three-letter code: IR) (formula: Ir).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	F	4	Total	Ir	0	0
			4	4		

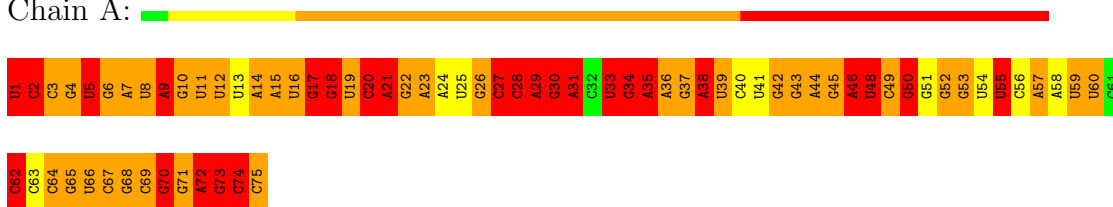
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

Note EDS was not executed.

• Molecule 1: P-SITE TRNA OF 70S RIBOSOME

Chain A:



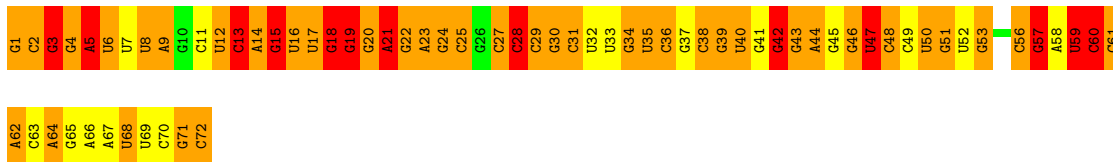
• Molecule 2: P-SITE CODON OF 70S RIBOSOME

Chain B:



• Molecule 3: A-SITE TRNA OF 70S RIBOSOME

Chain C:



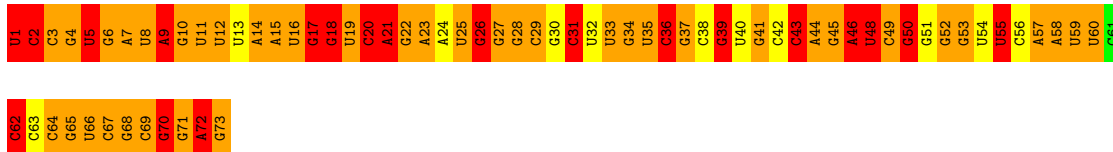
• Molecule 4: A-SITE CODON OF 70S RIBOSOME

Chain D:



• Molecule 5: E-SITE TRNA OF 70S RIBOSOME

Chain E:



- Molecule 6: PENULTIMATE STEM OF 16S RRNA IN THE 70S RIBOSOME

Chain F: 

There are no outlier residues recorded for this chain.

- Molecule 7: 900 STEM-LOOP OF 16S RRNA IN THE 70S RIBOSOME

Chain G: 

There are no outlier residues recorded for this chain.

4 Data and refinement statistics

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

Property	Value	Source
Space group	I 4 2 2	Depositor
Cell constants a, b, c, α , β , γ	508.02Å 508.02Å 802.79Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	(Not available) – 7.50	Depositor
% Data completeness (in resolution range)	97.7 ((Not available)-7.50)	Depositor
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	O	Depositor
R, R_{free}	(Not available) , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	4934	wwPDB-VP
Average B, all atoms (Å ²)	0.0	wwPDB-VP

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: 5MU, OMC, H2U, IR, YYG, 2MG, 5MC, 1MA, M2G, 7MG, 1MG, PSU

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	4.10	2/1538 (0.1%)	2.99	185/2393 (7.7%)
2	B	2.23	2/65 (3.1%)	1.08	0/98
3	C	2.94	149/1454 (10.2%)	4.65	377/2259 (16.7%)
4	D	1.19	0/69	2.51	7/105 (6.7%)
5	E	1.30	1/1536 (0.1%)	2.48	161/2393 (6.7%)
All	All	2.98	154/4662 (3.3%)	3.44	730/7248 (10.1%)

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
3	C	0	35

The worst 5 of 154 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	39	U	C1'-N1	151.98	3.76	1.48
3	C	19	G	C6-N1	-17.44	1.27	1.39
3	C	18	G	C8-N7	15.44	1.40	1.30
3	C	42	G	C8-N7	15.08	1.40	1.30
3	C	4	G	C8-N7	13.52	1.39	1.30

The worst 5 of 730 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	39	U	C6-N1-C1'	-73.97	17.65	121.20
1	A	39	U	O4'-C1'-N1	-20.01	92.19	108.20
3	C	22	G	N3-C4-C5	-19.64	118.78	128.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	20	G	N3-C4-C5	-19.30	118.95	128.60
3	C	57	G	N3-C4-C5	-19.27	118.97	128.60

There are no chirality outliers.

5 of 35 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	C	1	G	Sidechain
3	C	2	C	Sidechain
3	C	3	G	Sidechain
3	C	5	A	Sidechain
3	C	6	U	Sidechain

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1603	0	830	146	0
2	B	60	0	31	4	0
3	C	1546	0	796	61	0
4	D	63	0	33	4	0
5	E	1540	0	784	117	0
6	F	85	0	0	0	0
7	G	33	0	0	0	0
8	F	4	0	0	0	0
All	All	4934	0	2474	309	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 42.

The worst 5 of 309 close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:73:G:H2'	1:A:74:C:C5	1.46	1.48
1:A:67:C:OP1	3:C:4:G:C4'	1.65	1.40
1:A:67:C:OP1	3:C:4:G:C3'	1.72	1.37

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:67:C:OP1	3:C:4:G:C2'	1.73	1.35
1:A:67:C:OP1	3:C:4:G:O2'	1.57	1.20

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone ⓘ

There are no protein chains in this entry.

5.3.2 Protein sidechains ⓘ

There are no protein chains in this entry.

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	72/74 (97%)	32 (44%)	1 (1%)
2	B	2/3 (66%)	0	0
3	C	69/72 (95%)	15 (21%)	4 (5%)
4	D	2/3 (66%)	1 (50%)	0
5	E	72/72 (100%)	28 (38%)	1 (1%)
6	F	0/85	-	-
7	G	0/33	-	-
All	All	217/342 (63%)	76 (35%)	6 (2%)

5 of 76 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	2	C
1	A	5	U
1	A	6	G
1	A	9	A
1	A	16	H2U

5 of 6 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
3	C	21	A

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Mol	Chain	Res	Type
5	E	1	U
3	C	46	7MG
3	C	18	G
3	C	58	1MA

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

29 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	PSU	A	13	1	19,21,22	1.57	3 (15%)	23,30,33	1.26	3 (13%)
1	H2U	A	16	1	19,21,22	0.91	1 (5%)	27,30,33	1.08	2 (7%)
1	H2U	A	19	1	19,21,22	1.05	1 (5%)	27,30,33	1.27	4 (14%)
1	M2G	A	26	1	25,27,28	0.95	2 (8%)	34,40,43	3.89	7 (20%)
1	OMC	A	32	1	20,22,23	1.22	2 (10%)	25,31,34	2.10	3 (12%)
1	YYG	A	37	1	40,42,43	3.39	9 (22%)	50,62,65	8.83	18 (36%)
1	5MC	A	40	1	20,22,23	1.16	3 (15%)	26,32,35	1.81	3 (11%)
1	5MC	A	49	1	20,22,23	1.10	3 (15%)	26,32,35	2.08	3 (11%)
1	5MU	A	54	1	20,22,23	1.10	2 (10%)	25,32,35	1.76	2 (8%)
1	PSU	A	55	1	19,21,22	1.53	2 (10%)	23,30,33	1.15	3 (13%)
3	2MG	C	10	3	24,26,27	0.97	1 (4%)	32,38,41	3.00	9 (28%)
3	H2U	C	16	3	19,21,22	1.21	3 (15%)	27,30,33	1.81	6 (22%)
3	H2U	C	17	3	19,21,22	1.24	3 (15%)	27,30,33	1.91	6 (22%)
3	M2G	C	26	3	25,27,28	1.20	2 (8%)	34,40,43	2.25	7 (20%)
3	PSU	C	32	3	19,21,22	1.79	4 (21%)	23,30,33	1.33	4 (17%)
3	1MG	C	37	3	24,26,27	0.99	1 (4%)	34,39,42	9.06	7 (20%)
3	7MG	C	46	3	24,26,27	2.97	5 (20%)	34,39,42	1.56	6 (17%)
3	5MC	C	49	3	20,22,23	1.18	1 (5%)	26,32,35	1.83	5 (19%)
3	5MU	C	54	3	20,22,23	1.07	1 (5%)	25,32,35	2.17	3 (12%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	PSU	C	55	3	19,21,22	1.32	2 (10%)	23,30,33	1.31	4 (17%)
3	1MA	C	58	3	23,25,26	1.26	3 (13%)	32,37,40	1.62	7 (21%)
5	PSU	E	13	5	19,21,22	1.58	3 (15%)	23,30,33	1.27	3 (13%)
5	H2U	E	16	5	19,21,22	0.91	1 (5%)	27,30,33	1.08	2 (7%)
5	H2U	E	19	5	19,21,22	1.06	1 (5%)	27,30,33	1.27	4 (14%)
5	PSU	E	32	5	19,21,22	1.62	3 (15%)	23,30,33	0.99	1 (4%)
5	1MG	E	37	5	24,26,27	0.80	1 (4%)	34,39,42	8.82	8 (23%)
5	5MC	E	49	5	20,22,23	1.11	3 (15%)	26,32,35	2.05	3 (11%)
5	5MU	E	54	5	20,22,23	1.09	2 (10%)	25,32,35	1.79	2 (8%)
5	PSU	E	55	5	19,21,22	1.53	2 (10%)	23,30,33	1.15	3 (13%)

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	PSU	A	13	1	-	0/8/25/26	0/2/2/2
1	H2U	A	16	1	-	0/8/38/39	0/2/2/2
1	H2U	A	19	1	-	0/8/38/39	0/2/2/2
1	M2G	A	26	1	-	0/12/29/30	0/1/3/3
1	OMC	A	32	1	-	0/8/27/28	0/2/2/2
1	YYG	A	37	1	-	0/25/42/43	0/1/4/4
1	5MC	A	40	1	-	0/6/25/26	0/2/2/2
1	5MC	A	49	1	-	0/6/25/26	0/2/2/2
1	5MU	A	54	1	-	0/6/25/26	0/2/2/2
1	PSU	A	55	1	-	0/8/25/26	0/2/2/2
3	2MG	C	10	3	-	0/10/27/28	0/1/3/3
3	H2U	C	16	3	-	0/8/38/39	0/2/2/2
3	H2U	C	17	3	-	0/8/38/39	0/2/2/2
3	M2G	C	26	3	-	0/12/29/30	0/1/3/3
3	PSU	C	32	3	-	0/8/25/26	0/2/2/2
3	1MG	C	37	3	-	0/8/25/26	0/1/3/3
3	7MG	C	46	3	-	0/8/37/38	0/1/3/3
3	5MC	C	49	3	-	0/6/25/26	0/2/2/2
3	5MU	C	54	3	-	0/6/25/26	0/2/2/2
3	PSU	C	55	3	-	0/8/25/26	0/2/2/2
3	1MA	C	58	3	-	0/8/25/26	0/1/3/3
5	PSU	E	13	5	-	0/8/25/26	0/2/2/2
5	H2U	E	16	5	-	0/8/38/39	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	H2U	E	19	5	-	0/8/38/39	0/2/2/2
5	PSU	E	32	5	-	0/8/25/26	0/2/2/2
5	1MG	E	37	5	-	0/8/25/26	0/1/3/3
5	5MC	E	49	5	-	0/6/25/26	0/2/2/2
5	5MU	E	54	5	-	0/6/25/26	0/2/2/2
5	PSU	E	55	5	-	0/8/25/26	0/2/2/2

The worst 5 of 70 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	37	YYG	C12-N1	-13.28	1.30	1.39
3	C	46	7MG	C8-N9	-13.12	1.35	1.46
1	A	37	YYG	C2-N2	9.12	1.47	1.36
1	A	37	YYG	C3-N3	-8.58	1.37	1.49
1	A	37	YYG	O23-C21	6.31	1.43	1.34

The worst 5 of 138 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	37	YYG	C6-C5-N7	-60.58	131.01	134.24
3	C	37	1MG	C6-C5-N7	-51.80	131.48	134.24
5	E	37	1MG	C6-C5-N7	-50.26	131.56	134.24
1	A	26	M2G	C6-C5-N7	-20.76	131.34	134.14
3	C	10	2MG	C6-C5-N7	-12.86	132.41	134.14

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

Of 4 ligands modelled in this entry, 4 are monoatomic - leaving 0 for Mogul analysis.

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.

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 ⓘ

EDS was not executed - this section will therefore be empty.

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

EDS was not executed - this section will therefore be empty.

6.3 Carbohydrates ⓘ

EDS was not executed - this section will therefore be empty.

6.4 Ligands ⓘ

EDS was not executed - this section will therefore be empty.

6.5 Other polymers ⓘ

EDS was not executed - this section will therefore be empty.