wwPDB X-ray Structure Validation Summary Report (i)

Jan 31, 2016 – 06:55 PM GMT

PDB ID	:	1D4M
Title	:	THE CRYSTAL STRUCTURE OF COXSACKIEVIRUS A9 TO 2.9 A RESOLUTION
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Deposited on	:	1999-10-04
Resolution	:	2.90 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
http://wwpdb.org/validation/2016/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

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

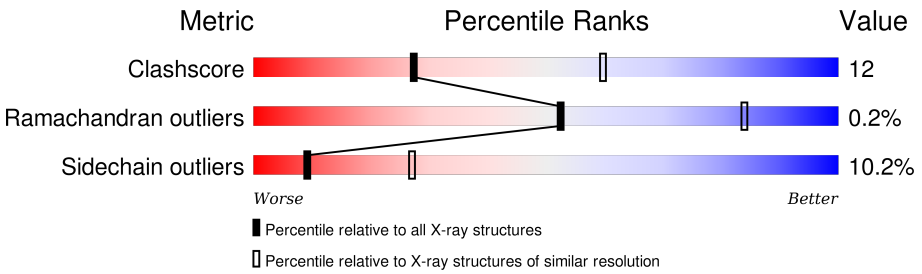
MolProbity	:	4.02b-467
Mogul	:	1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	trunk26865

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 2.90 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	102246	1668 (2.90-2.90)
Ramachandran outliers	100387	1630 (2.90-2.90)
Sidechain outliers	100360	1632 (2.90-2.90)

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

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	1	299	67% 22% 6% 5%
2	2	261	80% 13% • •
3	3	238	79% 16% 5%
4	4	68	74% 15% • 10%

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
6	W71	1	501	-	-	X	-
6	W71	1	502	-	-	X	-

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 7051 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 PROTEIN (COXSACKIEVIRUS A9).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	1	284	2261	1426	395	428	12	0	0	0

- Molecule 2 is a protein called PROTEIN (COXSACKIEVIRUS A9).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	2	252	1959	1239	332	372	16	0	0	0

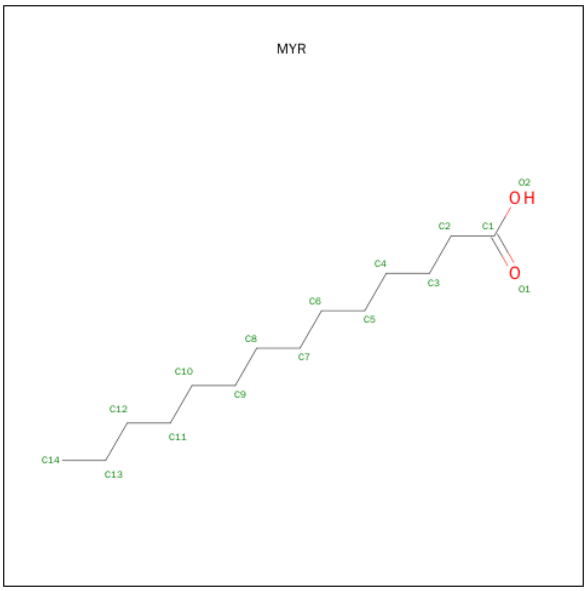
- Molecule 3 is a protein called PROTEIN (COXSACKIEVIRUS A9).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	3	238	1843	1173	302	350	18	0	0	0

- Molecule 4 is a protein called PROTEIN (COXSACKIEVIRUS A9).

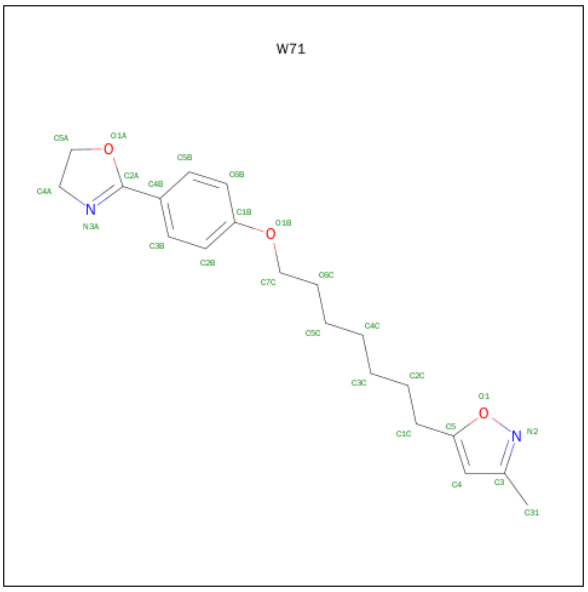
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	4	61	475	294	82	98	1	0	0	0

- Molecule 5 is MYRISTIC ACID (three-letter code: MYR) (formula: $C_{14}H_{28}O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
5	4	1	15	14	1	0	0

- Molecule 6 is 5-(7-(4-(4,5-DIHYDRO-2-OXAZOLYL)PHENOXY)HEPTYL)-3-METHYL ISOXAZOLE (three-letter code: W71) (formula: $C_{20}H_{26}N_2O_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
6	1	1	25	20	2	3	0	0
			Total	C	N	O		
6	1	1	25	20	2	3	0	0

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	1	162	162	162	0	0
			Total	O		
7	2	146	146	146	0	0
			Total	O		
7	3	112	112	112	0	0
			Total	O		
7	4	28	28	28	0	0

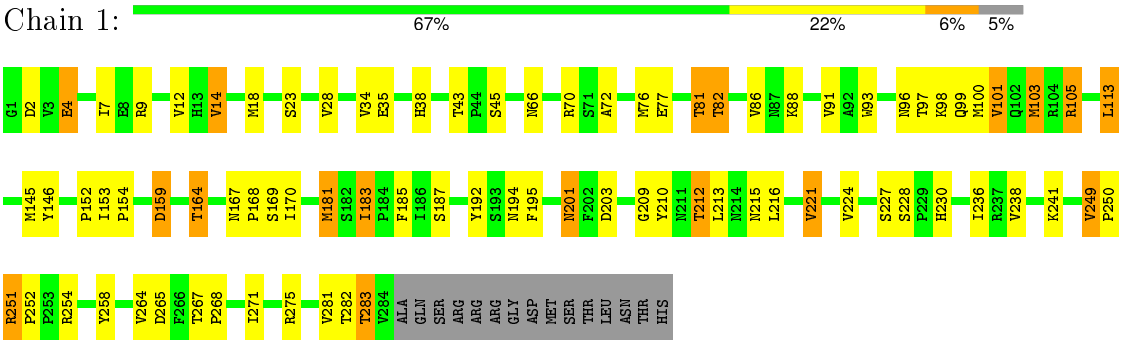
3 Residue-property plots (i)

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.

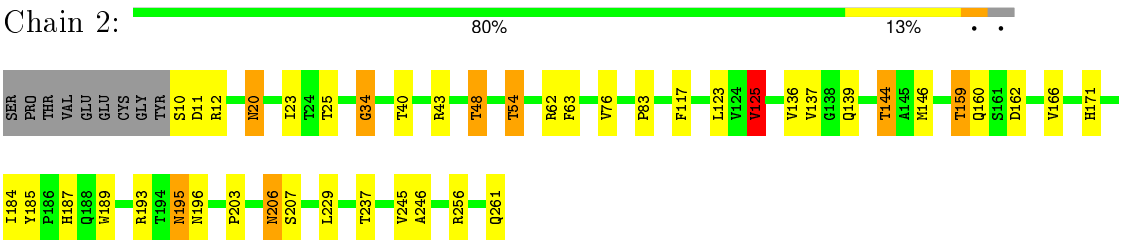
- Molecule 1: PROTEIN (COXSACKIEVIRUS A9)

Chain 1:



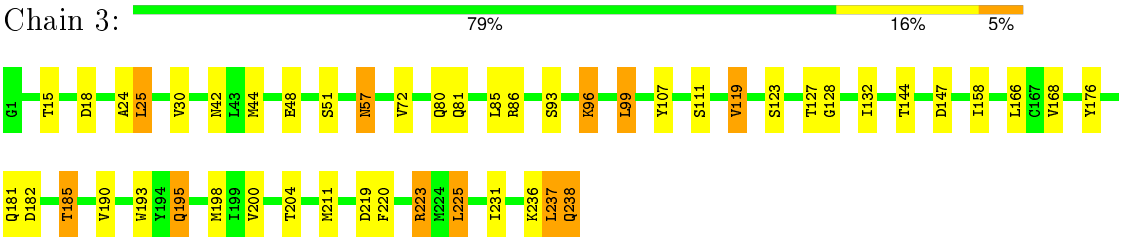
- Molecule 2: PROTEIN (COXSACKIEVIRUS A9)

Chain 2:



- Molecule 3: PROTEIN (COXSACKIEVIRUS A9)

Chain 3:



- Molecule 4: PROTEIN (COXSACKIEVIRUS A9)

Chain 4:

G2
A3
Q4
V5
S6
T10
H13
E14
T15
SER
LEU
SER
ALA
ALA
GLY
ASN
S23
I24
I25
T28
R43
Q44
D45
Q48
V57
N69

4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	487.30Å 358.10Å 305.70Å 90.00° 128.10° 90.00°	Depositor
Resolution (Å)	20.00 – 2.90	Depositor
% Data completeness (in resolution range)	41.0 (20.00-2.90)	Depositor
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 3.1	Depositor
R, R_{free}	0.169 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	7051	wwPDB-VP
Average B, all atoms ($Å^2$)	25.0	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: MYR, W71

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	1	0.58	0/2325	0.81	0/3172
2	2	0.55	0/2009	0.81	2/2740 (0.1%)
3	3	0.55	0/1892	0.80	0/2581
4	4	0.60	0/483	0.88	0/652
All	All	0.56	0/6709	0.81	2/9145 (0.0%)

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
2	2	0	1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	2	125	VAL	CB-CA-C	-5.86	100.27	111.40
2	2	195	ASN	CB-CA-C	-5.75	98.91	110.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	2	195	ASN	Mainchain

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	1	2261	0	2192	75	0
2	2	1959	0	1878	39	0
3	3	1843	0	1802	46	0
4	4	475	0	456	8	0
5	4	15	0	27	1	0
6	1	50	0	52	22	0
7	1	162	0	0	18	0
7	2	146	0	0	7	0
7	3	112	0	0	4	0
7	4	28	0	0	3	0
All	All	7051	0	6407	155	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 12.

The worst 5 of 155 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)
1:1:97:THR:H	6:1:502:W71:H313	1.16	1.04
6:1:501:W71:H312	6:1:502:W71:H2C2	1.43	1.00
1:1:82:THR:HB	7:1:617:HOH:O	1.60	0.99
1:1:4:GLU:HG2	4:4:4:GLN:HG2	1.50	0.92
1:1:97:THR:N	6:1:502:W71:H313	1.92	0.83

There are no symmetry-related clashes.

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	1	282/299 (94%)	264 (94%)	17 (6%)	1 (0%)	39	74
2	2	250/261 (96%)	227 (91%)	22 (9%)	1 (0%)	39	74
3	3	236/238 (99%)	228 (97%)	8 (3%)	0	100	100
4	4	57/68 (84%)	55 (96%)	2 (4%)	0	100	100
All	All	825/866 (95%)	774 (94%)	49 (6%)	2 (0%)	52	84

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	1	224	VAL
2	2	34	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	1	254/267 (95%)	222 (87%)	32 (13%)	5	16
2	2	209/217 (96%)	190 (91%)	19 (9%)	12	34
3	3	211/211 (100%)	194 (92%)	17 (8%)	15	39
4	4	53/57 (93%)	47 (89%)	6 (11%)	7	22
All	All	727/752 (97%)	653 (90%)	74 (10%)	9	27

5 of 74 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	2	20	ASN
2	2	146	MET
4	4	10	THR
2	2	23	ILE
2	2	54	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 20 such

sidechains are listed below:

Mol	Chain	Res	Type
2	2	163	GLN
2	2	206	ASN
3	3	195	GLN
2	2	119	GLN
2	2	160	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 carbohydrates 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	$\#\|Z\| > 2$
6	W71	1	501	-	24,27,27	1.90	5 (20%)	29,34,34	3.24	4 (13%)
6	W71	1	502	-	24,27,27	1.95	6 (25%)	29,34,34	3.42	4 (13%)
5	MYR	4	1	4	14,14,15	0.50	0	12,13,15	0.49	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
6	W71	1	501	-	-	0/14/22/22	0/2/3/3
6	W71	1	502	-	-	0/14/22/22	0/2/3/3
5	MYR	4	1	4	-	0/11/12/13	0/0/0/0

The worst 5 of 11 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	1	501	W71	C4-C5	-3.41	1.31	1.39
6	1	501	W71	C4B-C2A	-3.22	1.40	1.47
6	1	501	W71	C4-C3	-2.97	1.33	1.39
6	1	502	W71	C4-C3	-2.14	1.35	1.39
6	1	502	W71	C1C-C5	2.14	1.53	1.50

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	1	502	W71	O1A-C2A-N3A	-10.93	108.23	118.42
6	1	501	W71	O1A-C2A-N3A	-10.05	109.05	118.42
6	1	502	W71	C31-C3-N2	2.42	124.89	120.02
6	1	501	W71	C31-C3-N2	2.98	126.01	120.02
6	1	501	W71	C4A-N3A-C2A	5.68	112.14	106.74

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 23 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	1	501	W71	9	0
6	1	502	W71	22	0
5	4	1	MYR	1	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)

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

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

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

6.3 Carbohydrates (i)

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

6.4 Ligands (i)

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

6.5 Other polymers (i)

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