



wwPDB X-ray Structure Validation Summary Report ⓘ

Sep 27, 2017 – 08:54 PM EDT

PDB ID : 1I7O
Title : CRYSTAL STRUCTURE OF HPCE
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Deposited on : unknown
Resolution : 1.70 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 ⓘ symbol.

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

MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.9-1692
EDS	:	rb-20030345
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	rb-20030345

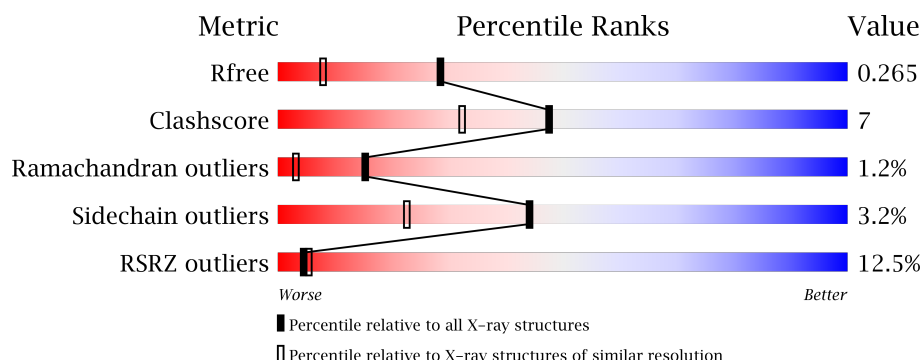
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 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}	100719	3453 (1.70-1.70)
Clashscore	112137	3876 (1.70-1.70)
Ramachandran outliers	110173	3815 (1.70-1.70)
Sidechain outliers	110143	3815 (1.70-1.70)
RSRZ outliers	101464	3491 (1.70-1.70)

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 $\leq 5\%$. 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	429	
1	B	429	
1	C	429	
1	D	429	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 13619 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 4-HYDROXYPHENYLACETATE DEGRADATION BI-FUNCTIONAL ISOMERASE/DECARBOXYLASE.

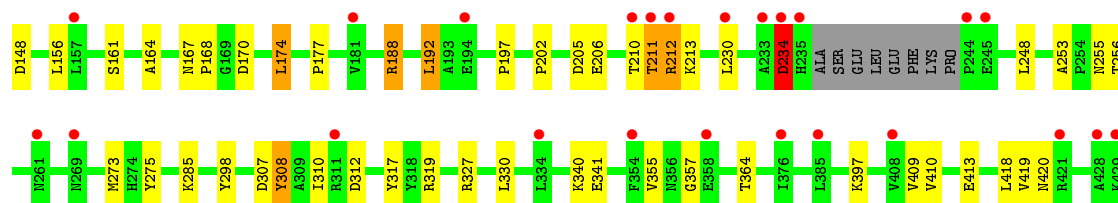
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	421	Total	C	N	O	S	11	1	0
			3237	2053	554	619	11			
1	B	421	Total	C	N	O	S	21	1	0
			3237	2053	554	619	11			
1	C	421	Total	C	N	O	S	15	1	0
			3237	2053	554	619	11			
1	D	421	Total	C	N	O	S	16	1	0
			3236	2053	554	618	11			

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca).

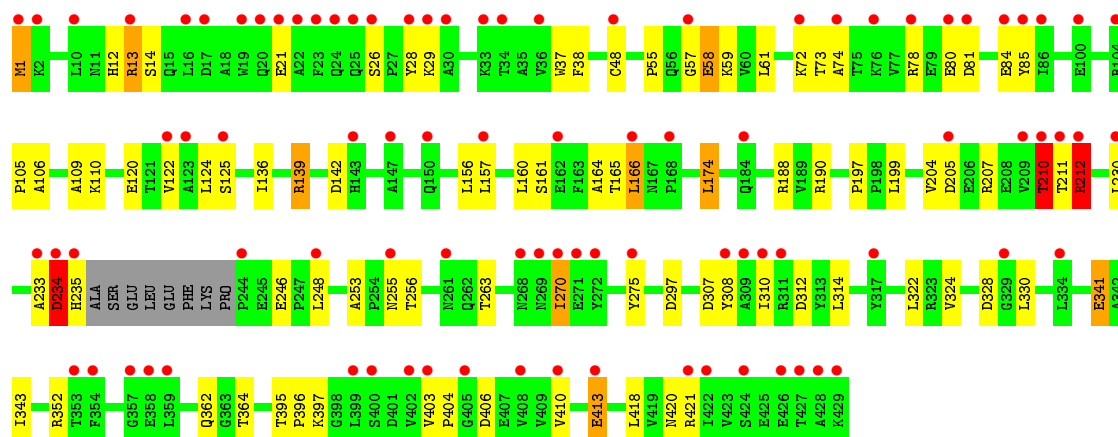
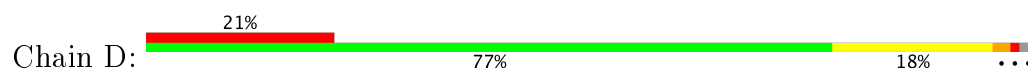
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total	Ca	0	0
			1	1		
2	A	1	Total	Ca	0	0
			1	1		
2	D	1	Total	Ca	0	0
			1	1		
2	C	1	Total	Ca	0	0
			1	1		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	214	Total	O	0	0
			214	214		
3	B	174	Total	O	0	0
			174	174		
3	C	165	Total	O	0	0
			165	165		
3	D	115	Total	O	0	0
			115	115		



• Molecule 1: 4-HYDROXYPHENYLACETATE DEGRADATION BIFUNCTIONAL ISOMER ASE/DECARBOXYLASE



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	126.08 Å 138.20 Å 103.97 Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	15.00 – 1.70 14.99 – 1.70	Depositor EDS
% Data completeness (in resolution range)	98.8 (15.00-1.70) 98.8 (14.99-1.70)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.64 (at 1.70 Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.251 , 0.278 0.234 , 0.265	Depositor DCC
R_{free} test set	9927 reflections (5.33%)	DCC
Wilson B-factor (Å ²)	30.4	Xtriage
Anisotropy	0.140	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.40 , 53.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	13619	wwPDB-VP
Average B, all atoms (Å ²)	45.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 26.47 % of the origin peak, indicating pseudo translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo translational symmetry is equal to 2.6190e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹ Intensities estimated from amplitudes.

² Theoretical 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section:
CA

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	0.98	3/3316 (0.1%)	1.01	9/4525 (0.2%)
1	B	0.94	5/3316 (0.2%)	0.99	16/4525 (0.4%)
1	C	0.91	3/3316 (0.1%)	1.02	13/4525 (0.3%)
1	D	0.86	2/3315 (0.1%)	1.02	13/4523 (0.3%)
All	All	0.92	13/13263 (0.1%)	1.01	51/18098 (0.3%)

The worst 5 of 13 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	139	ARG	CG-CD	17.47	1.95	1.51
1	A	212	ARG	CG-CD	-17.25	1.08	1.51
1	C	212	ARG	CG-CD	16.94	1.94	1.51
1	D	139	ARG	CB-CG	-16.49	1.08	1.52
1	C	188	ARG	CG-CD	-11.17	1.24	1.51

The worst 5 of 51 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	212	ARG	CG-CD-NE	-11.84	86.94	111.80
1	C	205	ASP	CB-CG-OD2	10.66	127.90	118.30
1	C	188	ARG	CB-CG-CD	10.29	138.36	111.60
1	C	212	ARG	CB-CG-CD	-9.09	87.97	111.60
1	D	139	ARG	CA-CB-CG	8.60	132.33	113.40

There are no chirality outliers.

There are no planarity outliers.

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	3237	0	3193	32	3
1	B	3237	0	3195	41	16
1	C	3237	0	3195	43	5
1	D	3236	0	3193	63	22
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	214	0	0	3	0
3	B	174	0	0	1	0
3	C	165	0	0	3	0
3	D	115	0	0	2	0
All	All	13619	0	12776	178	23

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 7.

The worst 5 of 178 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:B:1:MET:CE	1:B:1:MET:SD	2.02	1.45
1:B:57:GLY:HA3	1:B:58:GLU:HB2	1.25	1.18
1:D:205:ASP:OD2	1:D:207:ARG:NH2	1.89	1.06
1:C:57:GLY:HA3	1:C:58:GLU:HB2	1.10	1.05
1:A:57:GLY:HA3	1:A:58:GLU:HB2	1.38	1.03

The worst 5 of 23 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:B:139:ARG:NH1	1:D:13:ARG:CZ[2_554]	0.75	1.45
1:B:139:ARG:NH2	1:D:13:ARG:NH2[2_554]	0.75	1.45
1:B:139:ARG:CZ	1:D:13:ARG:CZ[2_554]	0.83	1.37
1:B:139:ARG:NH1	1:D:13:ARG:NE[2_554]	1.09	1.11

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:139:ARG:CZ	1:D:13:ARG:NH2[2_554]	1.11	1.09

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	418/429 (97%)	404 (97%)	9 (2%)	5 (1%)	15	3
1	B	418/429 (97%)	402 (96%)	11 (3%)	5 (1%)	15	3
1	C	418/429 (97%)	400 (96%)	14 (3%)	4 (1%)	18	4
1	D	418/429 (97%)	398 (95%)	14 (3%)	6 (1%)	13	2
All	All	1672/1716 (97%)	1604 (96%)	48 (3%)	20 (1%)	15	3

5 of 20 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	58	GLU
1	A	210	THR
1	A	230	LEU
1	A	234	ASP
1	B	58	GLU

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	348/360 (97%)	338 (97%)	10 (3%)	48	26
1	B	348/360 (97%)	336 (97%)	12 (3%)	42	20
1	C	348/360 (97%)	337 (97%)	11 (3%)	44	22
1	D	348/360 (97%)	336 (97%)	12 (3%)	42	20
All	All	1392/1440 (97%)	1347 (97%)	45 (3%)	44	22

5 of 45 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	348	ASN
1	C	188	ARG
1	D	270	ILE
1	C	21	GLU
1	C	192	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 36 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	274	HIS
1	B	420	ASN
1	D	286	GLN
1	B	348	ASN
1	C	12	HIS

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

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.

No monomer is involved in short contacts.

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 [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	421/429 (98%)	0.54	33 (7%) 14 17	32, 39, 56, 72	5 (1%)
1	B	421/429 (98%)	0.64	44 (10%) 7 8	33, 42, 62, 79	7 (1%)
1	C	421/429 (98%)	0.69	44 (10%) 7 8	31, 43, 61, 78	5 (1%)
1	D	421/429 (98%)	1.25	90 (21%) 1 1	32, 47, 68, 83	5 (1%)
All	All	1684/1716 (98%)	0.78	211 (12%) 4 5	31, 43, 63, 83	22 (1%)

The worst 5 of 211 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	211	THR	11.4
1	B	334	LEU	11.0
1	A	334	LEU	10.0
1	B	235	HIS	9.2
1	A	210	THR	9.2

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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(\AA^2)	Q<0.9
2	CA	C	1003	1/1	0.99	0.08	-1.66	42,42,42,42	0
2	CA	D	1004	1/1	0.88	0.07	-2.15	46,46,46,46	0
2	CA	A	1001	1/1	1.00	0.06	-2.19	35,35,35,35	0
2	CA	B	1002	1/1	0.99	0.04	-3.40	40,40,40,40	0

6.5 Other polymers [i](#)

There are no such residues in this entry.