wwPDB X-ray Structure Validation Summary Report (i)

Sep 27, 2021 – 11:00 am BST

PDB ID	:	7B25
Title	:	DtxR-like iron-dependent regulator IdeR (Q43A variant) complexed with cobalt and its consensus DNA-binding sequence
Authors	:	Maurer, D.; Marcos-Torres, F.J.; Griese, J.J.
Deposited on	:	2020-11-26
Resolution	:	2.34 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 (i) symbol.

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

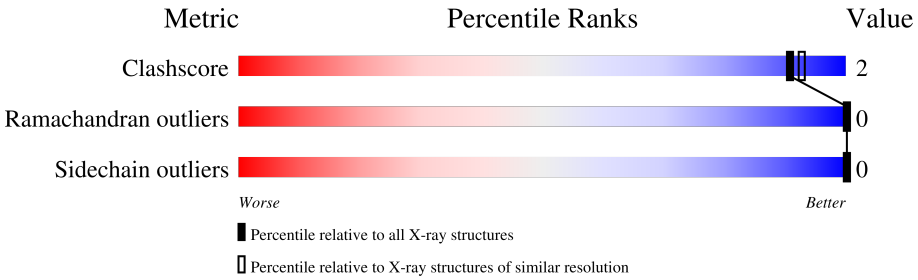
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.23.2

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 2.34 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	141614	2193 (2.36-2.32)
Ramachandran outliers	138981	2159 (2.36-2.32)
Sidechain outliers	138945	2160 (2.36-2.32)

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	233	58% . 41%
1	B	233	94% . .
1	C	233	93% 5% .
1	D	233	59% 41%
1	aa	233	39% 61%
1	dd	233	39% 61%
2	E	29	72% 28%
3	F	29	72% 28%

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 8256 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 DtxR family iron (Metal) dependent repressor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	138	Total	C	N	O	S	0	0	0
			1092	682	198	207	5			
1	B	227	Total	C	N	O	S	0	0	0
			1748	1086	320	334	8			
1	C	227	Total	C	N	O	S	0	0	0
			1748	1086	320	334	8			
1	D	138	Total	C	N	O	S	0	0	0
			1092	682	198	207	5			
1	aa	91	Total	C	N	O	S	0	0	0
			668	410	124	131	3			
1	dd	91	Total	C	N	O	S	0	0	0
			668	410	124	131	3			

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP A0A2A9J1W2
A	0	HIS	-	expression tag	UNP A0A2A9J1W2
A	43	ALA	GLN	engineered mutation	UNP A0A2A9J1W2
B	-1	GLY	-	expression tag	UNP A0A2A9J1W2
B	0	HIS	-	expression tag	UNP A0A2A9J1W2
B	43	ALA	GLN	engineered mutation	UNP A0A2A9J1W2
C	-1	GLY	-	expression tag	UNP A0A2A9J1W2
C	0	HIS	-	expression tag	UNP A0A2A9J1W2
C	43	ALA	GLN	engineered mutation	UNP A0A2A9J1W2
D	-1	GLY	-	expression tag	UNP A0A2A9J1W2
D	0	HIS	-	expression tag	UNP A0A2A9J1W2
D	43	ALA	GLN	engineered mutation	UNP A0A2A9J1W2
aa	-1	GLY	-	expression tag	UNP A0A2A9J1W2
aa	0	HIS	-	expression tag	UNP A0A2A9J1W2
aa	43	ALA	GLN	engineered mutation	UNP A0A2A9J1W2
dd	-1	GLY	-	expression tag	UNP A0A2A9J1W2
dd	0	HIS	-	expression tag	UNP A0A2A9J1W2

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Chain	Residue	Modelled	Actual	Comment	Reference
dd	43	ALA	GLN	engineered mutation	UNP A0A2A9J1W2

- Molecule 2 is a DNA chain called consensus DNA-binding sequence.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	E	29	Total	C	N	O	P	0	0	0
			593	283	107	174	29			

- Molecule 3 is a DNA chain called consensus DNA-binding sequence.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	F	29	Total	C	N	O	P	0	0	0
			596	284	109	174	29			

- Molecule 4 is COBALT (II) ION (three-letter code: CO) (formula: Co) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	2	Total	Co	0	0
			2	2		
4	B	2	Total	Co	0	0
			2	2		
4	C	2	Total	Co	0	0
			2	2		
4	D	2	Total	Co	0	0
			2	2		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	7	Total	O	0	0
			7	7		
5	B	5	Total	O	0	0
			5	5		
5	C	7	Total	O	0	0
			7	7		
5	D	10	Total	O	0	0
			10	10		
5	E	3	Total	O	0	0
			3	3		
5	aa	4	Total	O	0	0
			4	4		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	dd	7	Total O 7 7	0	0

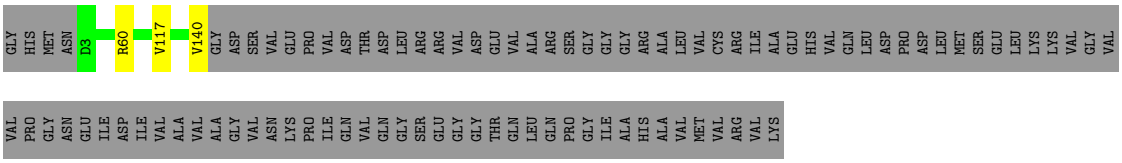
3 Residue-property plots (i)

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. 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.

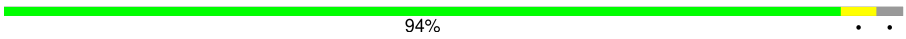
• Molecule 1: DtxR family iron (Metal) dependent repressor

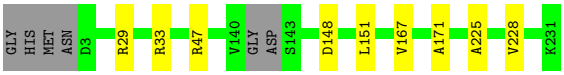
Chain A:



• Molecule 1: DtxR family iron (Metal) dependent repressor

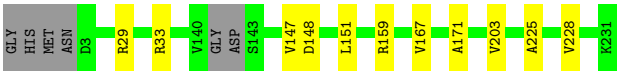
Chain B:





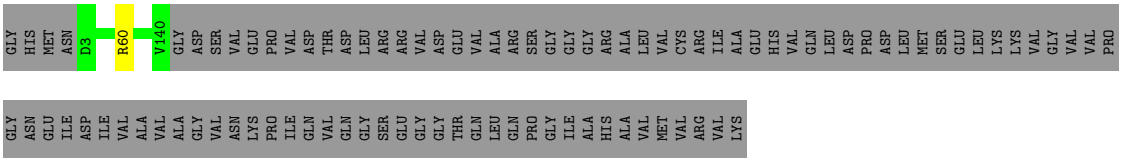
• Molecule 1: DtxR family iron (Metal) dependent repressor

Chain C:



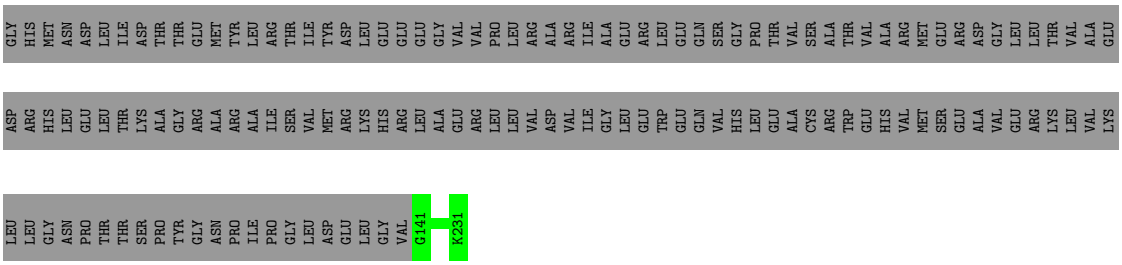
• Molecule 1: DtxR family iron (Metal) dependent repressor

Chain D:



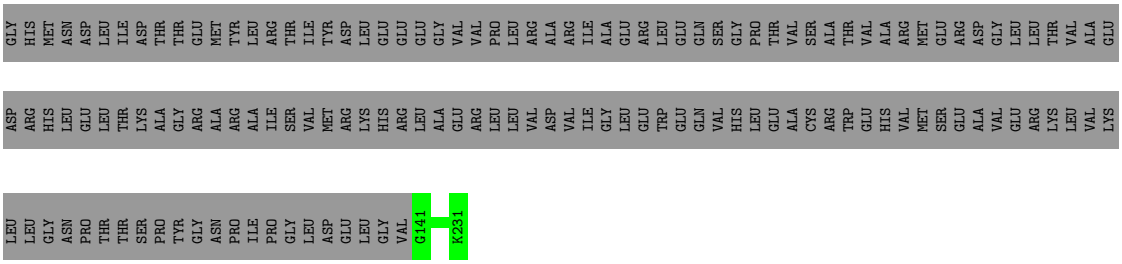
• Molecule 1: DtxR family iron (Metal) dependent repressor

Chain aa:



• Molecule 1: DtxR family iron (Metal) dependent repressor

Chain dd:

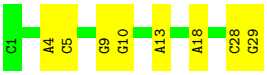


• Molecule 2: consensus DNA-binding sequence

Chain E:

• Molecule 3: consensus DNA-binding sequence

Chain F:



4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	192.66Å 110.86Å 86.75Å 90.00° 116.85° 90.00°	Depositor
Resolution (Å)	93.16 – 2.34	Depositor
% Data completeness (in resolution range)	53.9 (93.16-2.34)	Depositor
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.267 , 0.283	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	8256	wwPDB-VP
Average B, all atoms (Å^2)	67.0	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: CO

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	0.64	0/1108	0.73	0/1501
1	B	0.67	0/1770	0.74	0/2396
1	C	0.68	0/1770	0.74	0/2396
1	D	0.64	0/1108	0.73	0/1501
1	aa	0.68	0/674	0.74	0/911
1	dd	0.68	0/674	0.74	0/911
2	E	0.34	0/664	0.73	0/1022
3	F	0.32	0/668	0.72	0/1029
All	All	0.62	0/8436	0.74	0/11667

There are no bond length outliers.

There are no bond angle outliers.

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	1092	0	1110	3	0
1	B	1748	0	1787	5	0
1	C	1748	0	1788	6	0
1	D	1092	0	1110	2	0
1	aa	668	0	684	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	dd	668	0	684	0	0
2	E	593	0	328	6	0
3	F	596	0	328	6	0
4	A	2	0	0	0	0
4	B	2	0	0	0	0
4	C	2	0	0	0	0
4	D	2	0	0	0	0
5	A	7	0	0	0	0
5	B	5	0	0	0	0
5	C	7	0	0	0	0
5	D	10	0	0	0	0
5	E	3	0	0	0	0
5	aa	4	0	0	0	0
5	dd	7	0	0	0	0
All	All	8256	0	7819	22	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 2.

The worst 5 of 22 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)
2:E:13:DA:C2	3:F:18:DA:C2	2.98	0.51
3:F:28:DC:H2"	3:F:29:DG:C8	2.45	0.51
1:B:148:ASP:HB2	1:B:151:LEU:HD12	1.95	0.48
1:C:147:VAL:HG23	1:C:147:VAL:O	2.15	0.47
1:A:140:VAL:O	1:A:140:VAL:HG23	2.14	0.46

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	A	136/233 (58%)	132 (97%)	4 (3%)	0	100	100
1	B	223/233 (96%)	218 (98%)	5 (2%)	0	100	100
1	C	223/233 (96%)	216 (97%)	7 (3%)	0	100	100
1	D	136/233 (58%)	132 (97%)	4 (3%)	0	100	100
1	aa	89/233 (38%)	86 (97%)	3 (3%)	0	100	100
1	dd	89/233 (38%)	84 (94%)	5 (6%)	0	100	100
All	All	896/1398 (64%)	868 (97%)	28 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	118/194 (61%)	118 (100%)	0	100	100
1	B	190/194 (98%)	190 (100%)	0	100	100
1	C	190/194 (98%)	190 (100%)	0	100	100
1	D	118/194 (61%)	118 (100%)	0	100	100
1	aa	73/194 (38%)	73 (100%)	0	100	100
1	dd	73/194 (38%)	73 (100%)	0	100	100
All	All	762/1164 (66%)	762 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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

Mol	Chain	Res	Type
1	aa	208	GLN
1	aa	217	GLN
1	dd	208	GLN
1	dd	217	GLN

5.3.3 RNA

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates

There are no monosaccharides in this entry.

5.6 Ligand geometry

Of 8 ligands modelled in this entry, 8 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

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.