Supplementary Material:

Table S1. Crystal data and structure refinement for $(C_5H_{14}N_2)[MnCl_4(H_2O)_2]$.

Empirical formula	$(C_5H_{14}N_2)[MnCl_4(H_2O)_2]$
Crystal color /shape	Plate, colourless
Formula weight (g mol-1)	334.95
Volume (Å3)	1270.2 (3)
ρcal (Mg m-3)	1.752
Crystal system	monoclinic
Space group	P2/c
Z	4
a(Å)	12.394 (14)
b(Å)	9.408 (11)
c(Å)	11.879 (14)
α (°)	90
β(°)	113.518 (4)
γ (°)	90
θ range for data collection (°)	2.2<θ< 27.6
Temperature (k)	150
λ (Moka) (Å)	0.71073
Absorption correction	Multi-scan
Crystal size (mm3)	0.46*0.44*0.09
h.k.l range	-16<h<16, -12<k<10, -15<l<15
Diffractometer	D8 VENTURE Bruker AXS
Programs systems	SHELXT- 2015 and SHELXL-2018
No.of reflections collected	10704
No. of independant reflection	2925
No. of reflections observed (I >2s(I)	2681
Rint	0.061
F(000)	684
No.of parameters	152
Goodness of fit	0.95
Transmission factors	T_{max}= 0.846, T_{min}= 0.490
Rindices	R= 0.042, WR= 0.106

Table S2. Main distances (Å) and angles (°) for $(C_5H_{14}N_2)[MnCl_4(H_2O)_2]$ atomic arrangement.

$MnCl_4(H_2O)_2$ octahedron anion		**$C_5H_{14}N_2$ organic cation**	
Parameter	**value**	**Parameter**	**value**
Mn1-O1	2.1838 (15)	C1—N2	1.494 (3)
Mn1—O1^{i}	2.1838 (15)	C1—C7	1.510 (3)
Mn1—Cl1^{i}	2.4929 (6)	N2—C3	1.496 (3)
Mn1—Cl2	2.5909 (6)	C3—C4	1.520 (3)
Mn1—Cl2^{i}	2.5909 (6)	C4—C5	1.510 (3)
Mn2—O11	2.2331 (16)	C5—N6	1.514 (3)
Mn2—O11^{ii}	2.2331 (16)	N6—C7	1.495 (3)
Mn2—Cl11^{ii}	2.4888 (6)	N2—C1—C7	114.34 (18)
Mn2—Cl11	2.4888 (6)	C1—N2—C3	115.12 (17)
Mn2—Cl12^{ii}	2.6049 (6)	N2—C3—C4	111.65 (18)
Mn2—Cl12	2.6049 (6)	C5—C4—C3	115.40 (18)
O1—Mn1—O1^{i}	171.81 (10)	C4—C5—N6	115.01 (17)
O1—Mn1—Cl1^{i}	91.42 (5)	C7—N6—C5	117.94 (16)
O1i—Mn1—Cl1^{i}	94.37 (5)	N6—C7—C1	112.32 (18)
O1—Mn1—Cl1	94.37 (5)		
O1i—Mn1—Cl1	91.42 (5)		
Cl1i—Mn1—Cl1	90.00 (3)		
O1—Mn1—Cl2	89.12 (5)		
O1i—Mn1—Cl2	84.89 (5)		
Cl1i—Mn1—Cl2	92.13 (2)		
Cl1—Mn1—Cl2	175.865 (18)		
O1—Mn1—Cl2^{i}	84.89 (5)		
O1i—Mn1—Cl2^{i}	89.12 (5)		
Cl1i—Mn1—Cl2^{i}	175.865 (18)		
Cl1—Mn1—Cl2^{i}	92.13 (2)		
Cl2—Mn1—Cl2^{i}	85.96 (3)		
O11—Mn2—O11^{ii}	85.60 (8)		
O11—Mn2—Cl11^{ii}	87.92 (4)		
O11ii—Mn2—Cl11^{ii}	170.86 (4)		
O11—Mn2—Cl11	170.86 (4)		
O11ii—Mn2—Cl11	87.92 (4)		
Cl11ii—Mn2—Cl11	99.21 (3)		
O11—Mn2—Cl12^{ii}	91.63 (4)		
O11ii—Mn2—Cl12^{ii}	84.83 (4)		
Cl11ii—Mn2-Cl12^{ii}	88.915 (17)		
Cl11—Mn2—Cl12^{ii}	88.915 (17)		
Cl12ii—Mn2—Cl12	175.18 (3)		

Table S3. Observed vibration frequencies (cm^{-1}) and band assignments for $(C_5H_{14}N_2)[MnCl_4(H_2O)_2]$.

observed	Assignment
3118	ν_{as}(N-H)
3051	ν_{s}(N-H)
2805	ν_{s}(C-H)
1647	ν_{a}(C-H)
1570	$\delta(NH_2)$
1450	δ_{as}(C-N-H)
1385	$\delta(CH_2)$
1333	$\delta(CH_2)$
1103	ν_{as}(C-N)
1065	ν_{as}(C-N)
1021	ν_{as}(C-C)
976	$\rho(NH_2)$
880	δ(C-C-C)
780	δ(C-C-N)
529	δ(C-N-C)

Abbreviations: ν - stretching; δ - bending; ρ - rocking; s: Symmetric; as: Asymmetric.

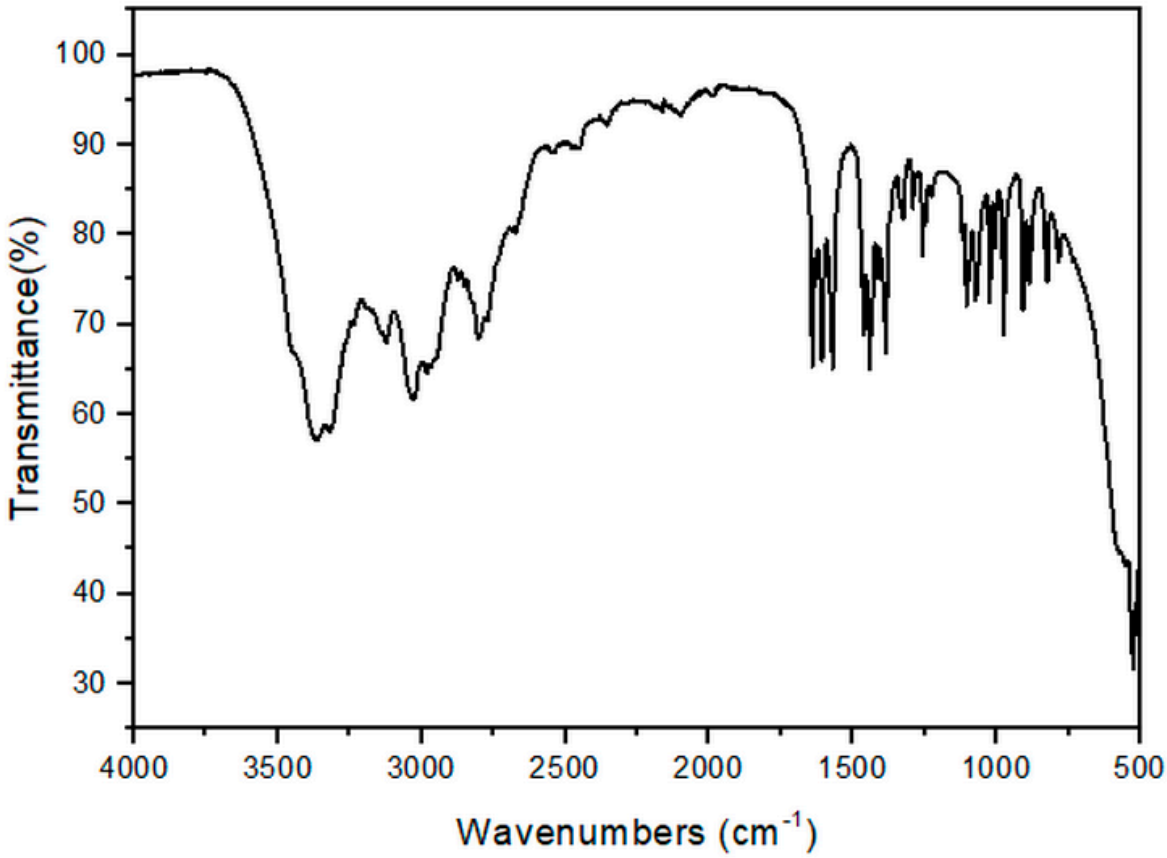

Figure S1. Infrared absorption spectra of the studied compound