

Abstract

Based on ferrocene derivatives as linkers, new metal organic frameworks (MOFs) with a general formula $[M_4(\text{tpxn})_2(\text{FcDC})_2(\text{H}_2\text{O})_4]^{4+}$ (FcDC = 1,1'-ferrocenedicarboxylate; tpxn = tppn, tpbn, tppen where tppn = N,N',N'',N'''-tetrakis-(2-pyridylmethyl)-1,3-diaminopropane, tpbn = N,N',N'',N'''-tetrakis-(2-pyridylmethyl)-1,4-diaminobutane, tppen = N,N',N'',N'''-tetrakis-(2-pyridylmethyl)-1,5-diaminopentane, M^{2+} = Cu^{2+} (1, 2, 3), Cd^{2+} (4), Co^{2+} (6) and Mn^{2+} (7)) are reported. These are heterometallic MOFs. When Fe^{3+} is chosen as the metal ion a homometallic MOF, $\{[\text{Fe}_2(\mu\text{-O})(\text{tpbn})(\text{FcDC})](\text{ClO}_4)_2 \cdot 4\text{H}_2\text{O}\}_n$ (5), is the product. Use of 1,1'-ferrocene disulphonate (FcDS) as the linker provides $[\text{Cu}_2(\text{tpbn})(\text{FcDS})_2]_n \cdot 4\text{CH}_3\text{CN} \cdot 2\text{H}_2\text{O}$ (8a) and $\{[\text{Fe}_2(\mu\text{-O})(\text{tpbn})(\text{FcDS})](\text{ClO}_4)_2 \cdot 4\text{H}_2\text{O}\}_n$ (9). All complexes were characterised by elemental analysis, FTIR spectroscopy, UV-visible spectroscopy, mass spectrometry, thermal gravimetric analysis, differential scanning calorimetry, single crystal and powder X-ray diffractometry. 1, 2, 3, 4, 6 and 7 are found to be discrete rectangular MOFs, 9 is a 1D coordination polymer, 5 is a 2D coordination polymer while 8a is a 2D MOF