

6(a)(i)	Ni(CO) ₄
6(a)(ii)	- ethanedioate given as C₂O₄ - formula shows one Ni and three ligands - charge = 4⁻ any two [1], all three [2] Ni(C ₂ O ₄) ₃ ⁴⁻ scores [2]
6(a)(iii)	F AND optical
6(b)(i)	N atom can donate one lone pair of electrons
6(b)(ii)	[Cd(en) ₂] ²⁺ AND has a larger <i>K</i> _{stab} / is more stable
6(b)(iii)	$\frac{[\text{Cd}(\text{CH}_3\text{NH}_2)_4]^{2+}}{[\text{Cd}^{2+}][\text{CH}_3\text{NH}_2]^4}$

1(a)	forms (one or more) stable ions / compounds / oxidation states with incomplete / partially filled (3)d orbital(s) / d shell / d sub-shell
1(b)(i)	(orbitals) are at the same energy
1(b)(ii)	(1s ²) 2s ² 2p ⁶ 3s ² 3p ⁶ 3d ⁹
1(c)(i)	[Cu(NH ₃) ₄ (H ₂ O) ₂] ²⁺ (aq) deep / dark / royal blue AND [CuCl ₄] ²⁻ (aq) yellow
1(c)(ii)	M1: d orbital(s) of different energy / d-d splitting occurs / d sub-shell splits M2: electron(s) promoted / excited M3: light / wavelength / frequency / photon absorbed AND complementary colour seen
1(d)(i)	M1: ligand exchange / replacement / substitution / displacement M2: [CuCl ₄] ²⁻ + 4NH ₃ + 2H ₂ O → [Cu(NH ₃) ₄ (H ₂ O) ₂] ²⁺ + 4Cl ⁻
1(d)(ii)	M1: one correct 3D structure of [Cu(H ₂ O) ₂ (NH ₃) ₄] ²⁺ M2: correct 3D stereoisomer structure of isomer 1
1(d)(iii)	cis isomer AND dipoles do not cancel
1(e)(i)	(two) oxygen and (one) nitrogen (can donate) three lone pair(s) of electrons (to the metal ion)
1(e)(ii)	[Co(C ₄ H ₅ NO ₄) ₂] ⁻
1(f)(i)	equilibrium constant for the formation of the complex (ion) in a solvent / water / solution OR from its constituent ions or molecules
1(f)(ii)	[Ag(CN) ₂] ⁻ (aq) AND largest (value of) <i>K</i> _{stab}
1(g)	M1 M2: any two [1], all four [2] - moles MnO₄⁻ = 0.015 × 18.70/1000 = 2.805 × 10⁻⁴ - moles SO₃²⁻ = 2.805 × 10⁻⁴ × 5/2 = 7.0125 × 10⁻⁴ (in 10 cm³) - moles SO₃²⁻ = 1.753 × 10⁻² (in 250 cm³) - mass Na₂SO₃ = 1.753 × 10⁻² × 126.1 = 2.21 g M3: % purity = 100 × 2.21 / 3.75 = 58.9 – 59.0 % min 2sf