

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)	$[\text{Cu}(\text{NH}_3)_4(\text{H}_2\text{O})_2]^{2+}(\text{aq})$ deep / dark / royal blue AND $[\text{CuCl}_4]^{2-}(\text{aq})$ 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: $[\text{CuCl}_4]^{2-} + 4\text{NH}_3 + 2\text{H}_2\text{O} \rightarrow [\text{Cu}(\text{NH}_3)_4(\text{H}_2\text{O})_2]^{2+} + 4\text{Cl}^-$
1(d)(ii)	M1: one correct 3D structure of $[\text{Cu}(\text{H}_2\text{O})_2(\text{NH}_3)_4]^{2+}$ 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)	$[\text{Co}(\text{C}_4\text{H}_5\text{NO}_4)_2]^-$
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)	$[\text{Ag}(\text{CN})_2]^- (\text{aq})$ AND largest (value of) K_{stab}
1(g)	M1 M2: any two [1], all four [2] - moles $\text{MnO}_4^- = 0.015 \times 18.70 / 1000 = 2.805 \times 10^{-4}$ - moles $\text{SO}_3^{2-} = 2.805 \times 10^{-4} \times 5/2 = 7.0125 \times 10^{-4}$ (in 10 cm³) - moles $\text{SO}_3^{2-} = 1.753 \times 10^{-2}$ (in 250 cm³) - mass $\text{Na}_2\text{SO}_3 = 1.753 \times 10^{-2} \times 126.1 = 2.21$ g M3: % purity = $100 \times 2.21 / 3.75 = 58.9 - 59.0$ % min 2sf