

Question	Part	Sub Part	Marking Guidance	Mark	Comments
9	(a)		Ti(IV) [Ar]	1	Or $1s^2 2s^2 2p^6 3s^2 3p^6$
			Ti(III) [Ar]3d ¹	1	Or $1s^2 2s^2 2p^6 3s^2 3p^6 3d^1$
			Ti(III) has a d electron that can be excited to a higher level	1	Allow idea that d electrons can be excited to another level (or move between levels)
			Absorbs one colour of light from white light	1	Allow idea that light is absorbed
			Ti(IV) has no d electron so no electron transition with energy equal to that of visible light	1	Allow Ti(IV) has no d electrons
9	(b)		[Cu(NH ₃) ₄ (H ₂ O) ₂] ²⁺	1	
			[Cr(OH) ₆] ³⁻	1	
			[CuCl ₄] ²⁻	1	
9	(c)	(i)	Rapid determination of concentration	1	Or easy to get many readings
			Does not use up any of the reagent/does not interfere with the reaction	1	Or possible to measure very low concentrations
9	(c)	(ii)	Curve starts with small gradient (low rate)	1	5 max
			Because negative ions collide so E_a high	1	
			Curve gets steeper	1	
			Because autocatalyst (Mn ²⁺) formed	1	
			Curve levels out approaching time axis	1	
			Because MnO ₄ ⁻ ions used up	1	Can score this mark and next one ONLY with simple curve (that is curve with gradually decreasing gradient)