	Statement	Guidance
9.1.U1	Oxidation and reduction can be considered in terms of oxygen gain/hydrogen loss, electron transfer or change in oxidation number.	Oxidation states should be represented with the sign given before the number, eg +2 not 2+
9.1.U2	An oxidizing agent is reduced and a reducing agent is oxidized.	
9.1.U3	Variable oxidation numbers exist for transition metals and for most main-group non-metals.	Oxidation number and oxidation state are often used interchangeably, though IUPAC does formally distinguish between the two terms. Oxidation numbers are represented by Roman numerals according to IUPAC.
9.1.U4	The activity series ranks metals according to the ease with which they undergo oxidation	The oxidation state of hydrogen in metal hydrides (-1) and oxygen in peroxides (-1) should be covered.
9.1.U5	The Winkler Method can be used to measure biochemical oxygen demand (BOD), used as a measure of the degree of pollution in a water sample.	
9.2.U6	**Voltaic (*Galvanic*) cells:** • Voltaic cells convert energy from spontaneous, exothermic chemical processes to electrical energy. • Oxidation occurs at the anode (negative electrode) and reduction occurs at the cathode (positive electrode) in a voltaic cell.	For voltaic cells, a cell diagram convention should be covered.
9.2.U7	**Electrolytic cells:** • Electrolytic cells convert electrical energy to chemical energy, by bringing about non-spontaneous processes. • Oxidation occurs at the anode (positive electrode) and reduction occurs at the cathode (negative electrode) in an electrolytic cell.	
19.1.U8	A voltaic cell generates an electromotive force (EMF) resulting in the movement • of electrons from the anode (negative electrode) to the cathode (positive electrode) via the external circuit. The EMF is termed the cell potential (E^o).	Electrolytic processes to be covered in theory should include the electrolysis of aqueous solutions (eg sodium chloride, copper(II) sulfate etc) and water using both inert platinum or graphite electrodes and copper electrodes. Explanations should refer to E_o values, nature of the electrode and concentration of the electrolyte
19.1.U9	The standard hydrogen electrode (SHE) consists of an inert platinum electrode in contact with 1 mol dm-3 hydrogen ion and hydrogen gas at 100 kPa and 298 K. The standard electrode potential (E^o) is the potential (voltage) of the reduction half-equation under standard conditions measured relative to the SHE. Solute concentration is 1 mol dm-3 or 100 kPa for gases. E^o of the SHE is 0 V.	
19.1.U10	When aqueous solutions are electrolysed, water can be oxidized to oxygen at the anode and reduced to hydrogen at the cathode.	
19.1.U11	$\Delta G^o = -nFE^\circ$.When E^o is positive, ΔG^o is negative indicative of a spontaneous process. When E^o is negative, G^o is positive indicative of a non-spontaneous process. When E^o is 0, then G^o is 0	
19.1.U12	Current, duration of electrolysis and charge on the ion affect the amount of product formed at the electrodes during electrolysis.	The term “cells in series” should be understood.
19.1.U13	Electroplating involves the electrolytic coating of an object with a metallic thin layer	