rsonalised Learning Checklist

AQA A-level Chemistry
3.1 Physical Chemistry
3.1.8 Born - Haber cycles
Define the terms: Enthalpy of formation, ionisation energy, enthalpy of atomisation, bond enthalpy, electron affinity and lattice enthalpy
Construct Born - Haber cycles to calculate lattice enthalpies using these enthalpy changes
Construct Born-Haber cycles to calculate one of the other enthalpy changes
Compare lattice enthalpies from Born-Haber cycles with those from calculations based on a perfect ionic model to provide evidence for covalent character in ionic compounds
Define the term enthalpy of hydration
Perform calculations of an enthalpy change using these cycles
Understand ΔS as the concept of increasing disorder and a means of accounting for the deficiencies of ΔH to explain feasible change
Calculate entropy changes from absolute entropy values
Use the relationship $\Delta G = \Delta H - T\Delta S$ to determine how ΔG varies with temperature
Use the relationship $\Delta G = \Delta H - T\Delta S$ to determine the temperature at which a reaction becomes feasible
3.1.9 Rate equations
Define the term order of reaction and rate constant
Perform calculations using the rate equation: $rate = k[A]^m[B]^n$
Explain the qualitative effect of changes in temperature on the rate constant k
Perform calculations using the equation $k = Ae^{-Ea/RT}$
Understand that the equation $k = Ae^{-Ea/RT}$ can be rearranged into the form $\ln k = -Ea/RT + \ln A$ and know how to use this rearranged equation with experimental data to plot a straight line –Ea/R
Use concentration time graphs to deduce the rate of a reaction
Use initial concentration time data to deduce the initial rate of reaction
Use rate concetration data or graphs to deduce the order (0, 1 or 2) with respect to a reactant
Derive the rate equation for a reaction from the orders with respect to each of the reactants
Use the orders with respect to the reactants to provide information about the rate determining step/ limiting step of a reaction
REQUIRED PRACTICAL 7: Measuring the rate of a reaction by initial rate method; by continuous monitoring method
3.1.10 Equilibrium constant Kp
Derive partial pressure from mole fraction and total pressure
Construct an expression for Kp for a homogeneous system in equilibrium
Perform calculations involving Kp
Predict the qualitative effects of changes in temperature and pressure on the position of equilibrium
Predict the qualitative effects of changes in temperature on the value of Kp
Understand that, whilst a catalyst can affect the rate of attainment at equilibrium, it does not affect the value of the equilibrium constant
3.1.11 Electrode potentials

Use E^{θ} values (standard conditions: 298K, 100 kPa, 1.00 mol dm^{-3}) to predict the direction of simple redox reactions; and the importance of the conditions
Calculate the EMF of a cell
Write and apply the conventional representation of a cell; including half equations
REQUIRED PRACTICAL 8: Measuring the EMF of an electrochemical cell
Understand that cells can be reachrgeable, non-rechargeable or fuel cells; the simplified electrode reactions in a lithium cell and an alkaline hydrogen-oxygen fuel cell
Benefits and risks to society of using these cells
Use given electrode data to deduce the reactions occuring in non-rechargeable and rechargeable cells
Deduce the EMF of a cell
Explain how the electrode reactions can be used to generate an electric current
3.1.12 Acids and Bases
Define acids, bases and acid-base equilibria
Convert concentration of hydrogen ions into pH and vice versa using $pH = -\log_{10}[H+]$
Calculate the pH of a solution of a strong acid from its concentration
Understand Kw is derived from the equilibrium constant for the slight dissociation of water and that it varies with temperature. $K_W = [H+][OH-]$
Use Kw to calculate the pH of a strong base from its concentration
Understand Ka is the dissociation constant for a weak acid and that weak acids and bases dissociate on slightly in aqueous solution. $pKa = -\log_{10} Ka$
Contruct an expression for Ka
Perform calculations relating the pH of weak acid to the concentraion of the acid and the dissociation constant Ka
Convert Ka into pKa and vice versa
Perform calculations for titrations of acids and bases based on experimental results
Sketch and explain the shapes of typical pH curves
Use pH cuves to select an appropriate indicator
REQUIRED PRACTICAL 9: Investigate how pH changes when a weak acid reacts with a strong base and when a strong base reacts with a weak acid
Understand what a buffer solution is; its applications and what acidic and basic buffers contain
Explain qualitatively the action of acidic and basic buffers
Calculate the pH of acidic buffer solutions

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