Chemistry Year 13 TERM3

I EVALUATE

•Evaluate how **E° values, entropy and K** help judge feasibility of redox reactions, electrochemical cells and disproportionation, including limitations due to kinetics and non-standard conditions.
•Assess **transition metal chemistry and catalysis** in terms of colour changes, reaction evidence, industrial importance and environmental impact.
•Review **multi-step organic synthesis and practical techniques** for accuracy, yield, safety and validity of conclusions.

I ANALYSE

- Interpret and manipulate **standard electrode potentials**: build cell diagrams, calculate E°cell, link to entropy and lnK, and use data to predict feasible redox and fuel-cell processes.
- Analyse **transition metal behaviour**: electronic configurations, variable oxidation states, ligands, shapes, ligand exchange, colour changes and catalytic roles.
- Use spectral and structural data (mass spec, IR, $^{13}C/^{1}H$ NMR) with functional-group chemistry of **arenes, amines, amides, amino acids and polymers** to deduce structures and design synthetic pathways.

I PRACTISE

- Carry out and interpret **redox practicals**: electrochemical cells (CP12), manganate(VII) titrations and iodine–thiosulfate titrations (CP13), including full calculations and uncertainty handling.
- Perform **transition metal experiments**: complex formation, ligand exchange, colour observations, ionic equations, amphoterism and oxidation-state changes (CP14 + suggested practicals).
- Apply **advanced organic techniques**: azo-dye preparation, amine synthesis, nylon formation, aspirin synthesis (CP16), and purification using reflux, distillation, extraction, recrystallisation and melting-point determination.

I LINK

- Connect **electrochemical cells and fuel cells** to energy storage, hydrogen technologies and industrial redox processes.
- Link **transition metal complexes and catalysis** to medicine (cis-platin, haemoglobin), industrial catalysis and environmental applications such as catalytic converters.
- Relate **arenes, dyes, polymers, amino acids and proteins** to pharmaceuticals, materials science, biochemical systems and sustainable chemistry.

I READ

•Unit 5 textbook sections on **Redox Equilibria, Electrode Potentials and Transition Metals**.
•Reading on **Benzene, Aromatic Substitution, Amines, Amides, Amino Acids, Polymers and Dyes**.
•Practical and data-book resources for **redox titrations, fuel cells, spectra and multi-step organic synthesis**.

I LEARN

Redox & Electrochemistry – oxidation numbers, standard electrode potentials, electrochemical series, fuel cells, entropy links and redox titrations.
Transition Metal Chemistry – complex ions, ligand types, shapes, colour changes, oxidation-state interconversions and catalytic behaviour.
Advanced Organic Chemistry & Synthesis – arenes, amines, amides, amino acids, proteins, polymer formation, azo dyes and multi-step synthetic planning using analytical data.