

Exam 3 Review CHEM 212

Topics covered in Unit 3:

Electrochemistry

Basic electrochemistry definitions

Galvanic cells at standard conditions

Line notation and drawing electrochemical cells

Nerst equation for calculating nonstandard conditions

E^0 and the equilibrium constant

Role of reference and indicator electrodes

Diagram and description of reference electrodes: SHE, SCE, Ag-AgCl

Indicator electrodes: metal electrodes, inert electrodes, ion selective electrodes, dropping mercury electrode

How a pH meter works: diagram, description, and principle sources of error

Briefly describe these techniques: Redox titrations, electrolysis, electrogravimetric analysis, constant current coulometry, controlled potential coulometry, amperometry, sampled current polarography, square wave voltammetry, anodic stripping voltammetry, cyclic voltammetry

Terms to know: junction potential, overpotential, ohmic potential, concentration polarization, counter electrode, working electrode, reference electrode, depolarizer, diffusion, convection, migration, half wave potential, residual current, faradaic current, charging current, electric double layer.

Spectroscopy

Properties of light (relationships between: c , ν , λ , E and A , T)

Potential interactions between light and matter (Jablonski diagram)

beer's law: uses, linear range, problems that can occur, not derivation

relate number of scans to signal to noise

Instrument pieces to be able to diagram and describe: monochromator,

Photomultiplier tube (PMT), flame on a Flame Atomic Absorption, nebulizer, hollow cathode lamp (HCL)

Be able to diagram and describe: single beam UV-Vis, photodiode array UV-Vis, double beam UV-Vis, Fourier Transform-Infra Red (FT-IR), flame Atomic absorption spectroscopy (Flame AAS), Atomic Emission Spectroscopy (AES), Atomic Fluorescence Spectroscopy (AFS), Inductively-coupled Plasma- Optical Emission Spectroscopy (ICP-OES)

Know atomic spectroscopy interferences and relative detection limits of atomic spectroscopy techniques

Terms to know: isobestic point, monochromatic, collimated, polarized, coherent, absorption, fluorescence, phosphorescence, internal conversion, intersystem crossing, diffraction, resolution, dispersion, stray light, photodiode array, thermocouple, thermoelectric, CCD, Fourier transform, interferogram, RMS, Boltzman distribution,

Things that **will** be on the exam:

- An electrochemistry problem calculating the E_{cell} for nonstandard conditions
- General info about techniques covered in the Electrochemistry jigsaw
- Instrument and instrument pieces diagrams and descriptions
- Conceptual questions and potentially calculations related to spectroscopy

Things to do to study:

- Review worksheets, videos, and homework problems
- Work old exams

Things you can use on the exam:

- Non programmable calculator
- **Equation sheet? You tell me what you need**
- Your brain