**Chemistry Assignment:**

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**Short notes on Electroplating**

**Electroplating** is a process that uses an electric [current](https://en.wikipedia.org/wiki/Direct_current) to [reduce](https://en.wikipedia.org/wiki/Redox) dissolved metal [cations](https://en.wikipedia.org/wiki/Cations) so that they form a thin coherent metal coating on an [electrode](https://en.wikipedia.org/wiki/Electrode). The term is also used for electrical [oxidation](https://en.wikipedia.org/wiki/Oxidation) of [anions](https://en.wikipedia.org/wiki/Anion) on to a solid substrate, as in the formation of silver chloride on silver wire to make [silver/silver-chloride electrodes](https://en.wikipedia.org/wiki/Silver_chloride_electrode). Electroplating is primarily used to change the surface properties of an object (such as [abrasion](https://en.wikipedia.org/wiki/Abrasion_(mechanical)) and wear resistance, [corrosion](https://en.wikipedia.org/wiki/Corrosion) protection, [lubricity](https://en.wikipedia.org/wiki/Lubrication), aesthetic qualities), but may also be used to build up thickness on undersized parts or to form objects by [electroforming](https://en.wikipedia.org/wiki/Electroforming).

The process used in electroplating is called [electrodeposition](https://en.wikipedia.org/wiki/Electrophoretic_deposition). It is analogous to a [concentration cell](https://en.wikipedia.org/wiki/Concentration_cell) [acting in reverse](https://en.wikipedia.org/wiki/Electrolytic_cell). The part to be plated is the [cathode](https://en.wikipedia.org/wiki/Cathode) of the circuit. In one technique, the [anode](https://en.wikipedia.org/wiki/Anode) is made of the metal to be plated on the part. Both components are immersed in a solution called an [electrolyte](https://en.wikipedia.org/wiki/Electrolyte) containing one or more dissolved [metal salts](https://en.wikipedia.org/wiki/Salt_(chemistry)) as well as other [ions](https://en.wikipedia.org/wiki/Ion) that permit the flow of electricity. A [power supply](https://en.wikipedia.org/wiki/Power_supply) supplies a [direct current](https://en.wikipedia.org/wiki/Direct_current) to the anode, oxidizing the metal atoms that it comprises and allowing them to dissolve in the solution. At the cathode, the dissolved metal ions in the electrolyte solution are reduced at the interface between the solution and the cathode, such that they "plate out" onto the cathode. The rate at which the anode is dissolved is equal to the rate at which the cathode is plated and thus the ions in the electrolyte bath are continuously replenished by the anode.

**Short notes on Physical Vapour Deposition (PVD)**

**Physical vapor deposition** (**PVD**) describes a variety of [vacuum deposition methods](https://en.wikipedia.org/wiki/Vacuum_deposition) which can be used to produce [thin films](https://en.wikipedia.org/wiki/Thin_film) and coatings. PVD is characterized by a process in which the material goes from a condensed phase to a vapor phase and then back to a thin film condensed phase. The most common PVD processes are [sputtering](https://en.wikipedia.org/wiki/Sputter_coating) and [evaporation](https://en.wikipedia.org/wiki/Evaporation_(deposition)). PVD is used in the manufacture of items which require thin films for mechanical, [optical](https://en.wikipedia.org/wiki/Thin-film_optics), chemical or electronic functions. Examples include semiconductor devices such as [thin film solar panels](https://en.wikipedia.org/wiki/Thin-film_solar_cell),aluminized [PET](https://en.wikipedia.org/wiki/Polyethylene_terephthalate) film for food packaging and [balloons](https://en.wikipedia.org/wiki/Balloon), and [titanium nitride](https://en.wikipedia.org/wiki/Titanium_nitride) coated cutting tools for metalworking. Besides PVD tools for fabrication, special smaller tools (mainly for scientific purposes) have been developed.

**Short notes on Chemical Vapour Deposition (CVD)**

**Chemical vapor deposition** (**CVD**) is a [vacuum deposition](https://en.wikipedia.org/wiki/Vacuum_deposition) method used to produce high quality, high-performance, solid materials. The process is often used in the [semiconductor industry](https://en.wikipedia.org/wiki/Semiconductor_industry) to produce [thin films](https://en.wikipedia.org/wiki/Thin_film).

In typical CVD, the [wafer](https://en.wikipedia.org/wiki/Wafer_(electronics)) (substrate) is exposed to one or more [volatile](https://en.wikipedia.org/wiki/Volatility_(chemistry)) [precursors](https://en.wiktionary.org/wiki/precursor), which [react](https://en.wikipedia.org/wiki/Chemical_reaction) and/or [decompose](https://en.wikipedia.org/wiki/Chemical_decomposition) on the substrate surface to produce the desired deposit. Frequently, volatile [by-products](https://en.wikipedia.org/wiki/By-product) are also produced, which are removed by gas flow through the reaction chamber.

[Microfabrication](https://en.wikipedia.org/wiki/Microfabrication) processes widely use CVD to deposit materials in various forms, including: [monocrystalline](https://en.wikipedia.org/wiki/Single_crystal), [polycrystalline](https://en.wikipedia.org/wiki/Polycrystalline), [amorphous](https://en.wikipedia.org/wiki/Amorphous), and [epitaxial](https://en.wikipedia.org/wiki/Epitaxy). These materials include: [silicon](https://en.wikipedia.org/wiki/Silicon) ([dioxide](https://en.wikipedia.org/wiki/Silicon_dioxide), [carbide](https://en.wikipedia.org/wiki/Silicon_carbide), [nitride](https://en.wikipedia.org/wiki/Silicon_nitride), [oxynitride](https://en.wikipedia.org/wiki/Silicon_oxynitride)), carbon ([fiber](https://en.wikipedia.org/wiki/Carbon_(fiber)), [nanofibers](https://en.wikipedia.org/wiki/Carbon_nanofibers), [nanotubes](https://en.wikipedia.org/wiki/Carbon_nanotube), [diamond](https://en.wikipedia.org/wiki/Synthetic_diamond) and [graphene](https://en.wikipedia.org/wiki/Graphene)), [fluorocarbons](https://en.wikipedia.org/wiki/Fluorocarbon), [filaments](https://en.wikipedia.org/wiki/Electrical_filament), [tungsten](https://en.wikipedia.org/wiki/Tungsten), [titanium nitride](https://en.wikipedia.org/wiki/Titanium_nitride) and various [high-k dielectrics](https://en.wikipedia.org/wiki/High-k_dielectric).