Thin films of lead sulphide (PbS) were deposited using chemical bath deposition (CBD) at different lead ion concentrations. A mixture of sodium hydroxide, varied concentrations of lead nitrate, triethanolamine (TEA), ammonia solution, thiourea, di-ionized and distilled water were used. A dip time of 120 min and pH of 9 at room temperature were maintained. It was found out that dielectric constants of the films varied from a maximum value of 12 to a minimum value of 2.3 in the photon energy range of 1.0 to 4.8 eV. Energy losses in the thin films were also found to be dependent on the concentration of lead ions in the bath and also this energy losses decreased as dielectric constants increased. It was concluded that the films could be used in photoconductivity, capacitance and solar cell absorber applications.