In this work the electrochemical behavior of Cu, Ni and Cu-Al-Ni alloys with different Ni content (5, 10, 30 and 45%) was investigated in naturally aerated stagnant aqueous acidic, neutral and basic solutions. The behavior of the different materials was also studied in chloride, sulfate and sulfate-chloride containing neutral solutions. Conventional electrochemical techniques such as open-circuit potential measurements, cyclic voltammetry, polarization methods and electrochemical impedance spectroscopy (EIS) were used. The surface morphology and constituents of the surface components were analyzed by SEM/EDAX analysis. The results have shown that the rate of corrosion of Cu-Al-Ni alloys in acidic, neutral and basic solutions depend on the Cu/Ni ratio. After long time of the electrode immersion in acidic solution, the corrosion resistance of the alloys increases with increasing the Ni content but when the Ni content exceeds 30%, the corrosion resistance decreases. The corrosion rate of the Cu-Al-Ni alloys in chloride free neutral solutions was found to increase with increasing the nickel content. In alkaline solution, the corrosion rate of the different Cu-Al-Ni alloys decreases with increasing the nickel content. In chloride containing neutral solution, the increase in the nickel content decreases the corrosion rate of the alloys. The increase of chloride concentration up to 0.075 M increases the corrosion rate and at higher concentrations ([Cl−] > 0.1 M) the corrosion rate decreases. In sulfate and sulfate-chloride solutions, the measured corrosion rate after 1 h of electrode immersion decreases with the increase of the Ni content. The impedance data were fitted to an equivalent circuit model that explains that different electrochemical processes occurring at the electrode/electrolyte interface.