

The Mechanism of Formation of Iron Oxide and Oxyhydroxides in Aqueous Solutions at Room Temperature(Chemistry)

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The Mechanism of Formation of Iron Oxide and Oxyhydroxides in Aqueous Solutions at Room Temperature

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Corros. Sci., **14** (1974), 131.

For a better understanding of the atmospheric rusting of iron and steels, the present work is aimed to explore the mechanism of formation of green rusts, Fe_3O_4 , $\alpha\text{-FeOOH}$, $\beta\text{-FeOOH}$, $\gamma\text{-FeOOH}$, $\delta\text{-FeOOH}$ and amorphous ferric oxyhydroxide in aqueous solution at room temperature. The formation processes on which end products are determined are strongly affected by the oxidation rate, pH and the structure and composition of initial and intermediate species of iron. The systematic diagram of formation processes of iron oxide and oxyhydroxides has been presented, in which both dissolved and solid species of iron are included.

The Mechanism of Atmospheric Rusting and the Protective Amorphous Rust on Low Alloy Steel

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Corros. Sci., **14** (1974), 279.

Atmospheric rusting of mild and low alloy steels was studied by means of infra-red and far infra-red spectrophotometries, X-ray and electron diffraction methods and scanning electron microscopy. The rusting process can be interpreted on the basis of a previously reported diagram for rust formation in aqueous solution.

A large amount of amorphous matter in rust formed in semi-rural atmosphere was identified by infra-red and far infra-red spectra as amorphous ferric oxyhydroxide, $\text{FeO}_x(\text{OH})_{3-2x}$. The amorphous ferric oxyhydroxide rust on low alloy steel was dense and uniform, and contained a considerable amount of bound water. From these results it can be concluded that the amorphous ferric oxyhydroxide rust acts as a protective barrier against atmospheric rusting of the steels. Cu, P and Cr in low-alloy steels are inferred to favour the formation of crack-free, uniform rust layer and help to produce uniform amorphous ferric oxyhydroxide.

Electron Transfer Reaction in the Triplet State. Role of Ferrocene as an Electron Donor

Koichi KIKUCHI, Hiroshi KOKUBUN and Masae KIKUCHI

Bull. Chem. Soc. Japan, **48** (1975), 1378.

Quenching of the triplet state of methylene blue by ferrocene and *p*-phenylenediamine in ethanol has been investigated by an emission-absorption flash technique. The triplet dye is quenched by ferrocene and *p*-phenylenediamine at a diffusion-controlled rate, yielding the semi-reduced dye. Efficiency of the semi-reduced dye formation is 0.09 and 1.0 for ferrocene and *p*-phenylenediamine, respectively. Since the triplet level of the dye is lower than that of ferrocene,