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Dipartimento di Chimica, Materiali e Ingegneria Chimica "Giulio Natta"

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MODELLO TAFEL-PIONTELLI PER LA PREVISIONE DELLA VELOCITÀ DI CORROSIONE IN AMBIENTE ACIDO

Applicazione al caso della corrosione da CO_2 (sweet corrosion) dell'acciaio: confronto con modelli esistenti

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1 Introduction: aim of the work

The aim of the research is to validate a model for the calculation of corrosion rate of active metals, as carbon steel, in acidic environment, i.e. when the main cathodic corrosion process is hydrogen evolution. Nowadays, in industrial application the evaluation of the corrosiveness of an environment with respect to a metal is often faced with an empirical (or semi-empirical) approach; indeed, the available corrosion maps and models are mainly based on experimental observations, laboratory and/or field measurements. The proposed model, called "**Tafel-Piontelli Model**", is strongly based on the theory of corrosion kinetics, in particular on Tafel law and on the studies of R. Piontelli in this regard. An important application of the model could be the evaluation of corrosion rate of carbon steel in the presence of carbonic acid; this corrosion form is called "sweet corrosion" and represents a threat in O&G industry.

The research activities, hereafter described, are divided into three main sections:

- PHASE 1: state of the art on the available models for predicting the corrosion rate of carbon steel in an acid environment and in particular in the presence of CO_2 (sweet corrosion);
- PHASE 2: description of the basic Tafel-Piontelli model;
- PHASE 3: experimental validation of the Tafel-Piontelli model for predicting the corrosion rate in an acid environment.