

Study the effect of soil corrosion of metal pipes (cast iron and wrought iron)

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Abstract

The aim of this study is to show the extent of soil effect (soil Technical Institute / Cote) on two types of metals (cast iron and wrought iron) when immersing the two species in the soil and certain period of time, after a month of immersing the pieces in the soil were dug out the first two pieces to calculate the amount of corrosion output was the first piece weighed before immersion (892.21 g) and after immersion (886.44 g) and the second piece before immersion (543.97 g) and after immersion was weighing (497.723 g) and after two months of immersion were extracted the other pair of the pieces was the first weight

(885.15 g) the second and weight (487.97 g), and after the third month was extracted last two pieces was weigh (866.16 grams) (482.52 g) consecutive laps that the percentage of soil effect on the wrought iron than in cast iron and is due to several reasons, including the proportion of carbon, as well as elements of foundries used to have a clear effect of leading to a change in the metal corrosion response.

Introduction

The corrosion of metal established embedded (buried) in the soil of the biggest engineering and economic problems and the most widespread in the world and

clearly demonstrates it through the significant impact of these problems on those projects. Those prone to erosion projects include millions of kilometers of pipelines that transport natural gas and crude oil and petrochemical products as well as other projects under the earth's surface gastric ground reservoirs for storage and lines of domestic and international telecommunications networks and distribution of potable water transfer [1].

All countries in the world, especially the industrial ones suffer of the corrosion problem, so they are trying hard to get rid of this problem in various ways, we have this phenomenon caused a lot of damage on the US economy, for example, where they were spending more than \$ 6 billion due to the pipe industry losses due to its exposure to failure due to corrosion. In addition,

losses last losing a movable products by the corroded pipes and resulting accidents and fires lead to enormous losses [3.2] The global interest in this phenomenon is reflected in the large number of completed research around the world and trying to find suitable to avoid engineering solutions the occurrence of corrosion process by applying the study of many modern engineering methods, which aims to prevent it from happening or reduce the side effects and the resulting m n heavy losses. The risk of corrosion lies in its diversity and the variety of reasons for this varied and numerous protection methods it, note that the most common types of corrosion serious is the corrosion that occurs in steel pipes buried underground [4]is corrosion in wet soil soft more from corrosion in the soil, dry soil saturated of water , because

the occurrence of corrosion process requires the presence of moisture and oxygen together, known as the dry soil lacks moisture the dry soil lacks moisture saturated the soil lacks oxygen [5].

This type is called erosion wet the dry corrosion occurs at high temperatures exemplified by oxidation, and the different layers of corrosion formed on the surface in terms of physical and chemical properties, as these layers vary change amid corrosion in atmospheric air is mild layers and thickness are very few compared to the erosion by water or soil it shall be in accordance T. corrosion thickness greater negative impact on the metal [7.6]. That the factors that enhance the corrosion process in the soil (Cl) and the concentration of salts, chlorides (SO is the relative humidity and oxygen concentration, and the

concentration of sulfates (4 currents and stray of (Porosity) and porosity (PH) present in the soil and the pH value and electrical conductivity of the soil, which features a large impact on the functioning interaction electrochemical, and electrical conductivity depends on the amount of moisture and salts in the soil [5] that the flow of electric current from the area of the anode to the cathode space may generate corrosive signatories cells begin either on a metal surface and one because of the different potential difference between two points in the metal is called a cell corrosion or between two surfaces metal is called a cell corrosion in kind or (Microcell corrosion) microscopy provided the presence of electrolytes in both cases. [8] the protection process (Macrocell corrosion) microscopic buried pipes in the soil is not easy, he needs to

accuracy and attention and follow-up and by the fact that the variables that help the emergence of on-site erosion and stimulated and are available in abundance, including the heterogeneity of soils and the different components and humidity between the point and the other salt concentration, temperature and the type of metal used and its components and many other factors [9,1].

It has been used in this study were sulfur soil brought from an industrial site which is the origin of sulfur Mishraq. Tested models steel carbon-treated thermally to study] (Wadullah conducted researcher ((2006 effect on corrosion resistance among multiple erosion but the most impact on the metal appeared in the sand moist soil used in the study. Instructed the reason for this is that the soil used for the kind of fragile wet, as characterized by high

electrical conduction because they contain a percentage of salts as well as one of the protection methods used to prevent erosion of pipes] (Al-Abdullatif humidity. and studied the researcher ((2007 steel carbon-buried in the soil, as the researcher used cathodic protection to be considered the most efficient and studied the relationship between power given to protect the electrical conductivity of the soil used in the test. and reach a mathematical relationship led to improve the efficiency of protection system cathodic used in the specifications as field selected for testing and study, and a decrease in corrosion rates recorded by 3% and this in turn led to a reduction of energy consumption. given the importance of this topic has been the work and the completion of this research, which included the study and

understanding of this dangerous phenomenon, namely the phenomenon of erosion in the buried steel pipes in the soil, and through the work of a study of systems possible protection and in some industrial sectors and the provision of laboratory data help in finding related costs protection methods of base economic least high efficiency.

The practical side

It was prepared three pieces of metal (cast iron) with the specifications set out in Table (1) and three other pieces of metal (wrought iron) with descriptors set out in Table 2 and the model used shown in Figure (1) was then weighed and then after that has been submerged in the soil of the technical Institute / Cote to see how soil effect on the two types of metals and after immersion of all minerals in the soil was

extracted one model of each metal a month after immersion, and then weighed to see how much weight difference where the weight before immersion in relation to the metal he (892.21 g) and then extracted from the soil was weighed (886.44 grams) and thus the amount of the difference in weight is equal to (5.77 grams) and either the second model was weighed before immersion (543.97 grams) and then extracted from the soil was a weight (497.723 g) and this is the amount of the difference in weight (46.246 grams) and this in turn determines the extent of corrosion winning from the soil as well and then two months later was extracted last of the miners buried model the amount of net weight (885.15 grams) was second (487.97 grams), respectively, and three months later was extracted third model and calculate the weight It was

the net weight of the two pieces is (866.16 grams) (482.52 grams), respectively, this indicates that the amount affected by metal (wrought iron) is more than metal (cast iron) as evidenced weight difference

resulting vulnerability to soil and attic, use of metal (cast iron) as pipe resistant to soil better than metal (wrought iron).

Table (1) shows the proportions of cast iron specifications

Ratios							Metal name	sequence
magnesium	manganese	sulfur	silicon	carbon	Phosphorus	iron	Cast iron	1
-0.005 %0.04	-0.03 %0.05	-0.005 %0.02	-0.1 %0.5	- 2.2 %2.8	-0.04 %0.005	-3.4 %3.3		

Table (2) shows the characteristics of wrought iron

Properties	Metal name	sequence
Pure iron can easily be filled is an excellent conductor of heat and electricity, magnetic easily, a little stiffness, high flexibility Carbon ratio: less than 0.25% Fusion 1500 ° c	wrought iron	1



Figure (1) the model used to test the effect of the soil

Conclusions

1- affected by the amount of metal (wrought iron) over metal (cast iron) evidenced by the change in weight was little.

2- Preferably use metal (cast iron) metal (cast iron) high resistance to corrosion.

3- commensurate with the severity of corrosion over the ratio of carbon directly proportional

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