

**INFLUENCE OF IRON-CARBONACEOUS  
ALLOY'S  
CARBON PHASE ON CORROSION POTENTIAL**

**S.N.Saltykov<sup>a</sup>, S.A.Kaluzhina<sup>b\*</sup>**

*Technical University,  
Lipetsk, 398055, Russia  
University,  
Voronezh, 394006, Russia*

*<sup>a</sup> Lipetsk State  
Moskovskaya st. 30,  
<sup>b</sup> Voronezh State  
University Sq. 1,*

Investigation of iron-carbonaceous alloy's electrochemical corrosion is basing on regularities of iron's electrochemical dissolution (alloy's ferrite component). In this case participation of carbon phase in process and it's electrochemical properties are set aside. At the same time a numerous data about influence of alloy's phase and a structure composition on corrosion resistance [1-3] in different solutions is confirmed the necessity of the research of carbon phase's role in electrochemical process passing on interface iron-carbonaceous alloy / electrolyte in detail. It is obviously that change of alloy's metallography structure one must to influence on steady state potential (corrosion potential) value. Analysis of this question at the example of iron-carbonaceous alloy's series is the subject of the present work.

Experiments were sarried out in sulfate solutions on alloys with increasing ac concentration carbon and changing of kind structure: armco-iron (ferrite), steel 3 (ferrite-perlite), steel U8 (perlite), white cast iron (ferrite-cementite structure). On base of chronopotentiogramm were determined of the corrosion potential's value ( $E_{cor}$ ) relatively silver/silver chloride reference electrode.

Results have shown that forming of potential on armco-iron (ferrite structure) is the longest while value  $E_{cor}$  on steel U8 and white cast iron (cementite phase) is the most steady. It is known [4] that anodic process in sulfate electrolytes is localizing on ferrite phase but cathodic reduction of hydrogen takes place on alloy's carbon phase. Such phase is contained both in white cast iron and steels in different quantity. Therefore on the one hand, equality of values  $E_{cor}$  for steel U8 and white cast iron is expected. On the other hand, in line: armco-iron – steel 3 – steel U8 – white cast iron monotonous increase of potential with increase of concentration carbon is probably. However, it was shown that potential of steel 3 (less quantity cementite) is found between values of steel U8 and white cast iron (most negative and most positive values accordingly). To our mind the cause of it is not only in availability of electropositive phase cementite but also in peculiarities of it's forming and arrangement in alloy's structure. For example, in steel 3 and U8 cementite forms a part of eutectoid mixture (perlite) and difference between steels is a quantity of cementite. But in steel 3 perlite is sections on ferrite phase but structure of steel U8 is homogeneous and it is interchange of plate of ferrite and cementite [5]. Difference of white cast iron's structure and steel U8 structure due to the process of metallography structure's forming. When alloy's structure is formed after eutectic transformation precedes to eutectoid and secondary cementite is formed and it doesn't enter in perlite. In steel U8 cementite is primary.

In that way, primary or secondary cementite in structure of alloy can be to change potential corrosion and influence on alloy's corrosion resistance.

1. Kalmykov V.V. *Protection of metals*, Vol 23 (1987) p. 659.
2. Kalmykov V.V., Grechnaya I.Ya. *Protection of metals*, Vol 28 (1992) p. 750.
3. Saltykov S.N., Makarov G.V., Toroptseva E.L. *Protection of metals*, Vol 37 (2001) p.186.
4. Todt F. *Corrosion and protection from corrosion*, Moscow, Chemistry, (1966), 848p.
5. Gulyaev A.P. *Physical metallurgy: Moscow, Metallurgy* (1986), p.148-160.