

ABOUT FEATURES OF HYDROGEN ACCUMULATION ON ELECTRODES

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As it known, hydrogen dissolves in platinum metals, metals of iron group, in small quantities in Ag, Cu, Mo and does not dissolve in mercury. The skilled data specifies that metals forming hydrides intensively absorb the atomic hydrogen. Lanthanum, cerium, titan, zirconium, thorium, vanadium, niobium and tantalum may be concerned to them.

The unusual behavior of solubility in H_2 – gas / metal and H_2 – gas / solution / metal systems is investigated. For all that an expression was used by the relation of $[H] / [Me]$ atoms concentration in view of solubility in wide range of pressure which can be described by a logarithmic ratio:

$$\lg P_{H_2} = a + b \frac{[H]}{[Me]}.$$

Here coefficient b is linked to increase of Me volume at hydrogen absorption and compressibility.

For establishment of laws of hydrogen accumulation in electrochemical processes, solubility of hydrogen in electrode metal is theoretically investigated. It is established, that solubility of hydrogen together with diffusion process plays an important part in the overstrain phenomenon. In view of skilled data it is found out, that in this case the hydrogen overstrain slowly sets in.

For various metals total H_2 overstrain can occur within minutes and even hours. It can be link to physical and chemical phenomena and metals surface properties.

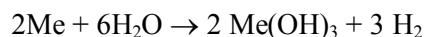
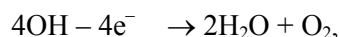
Modern position of surface theory defects with participation of hydrogen is described in works [1, 2].

In terms of imposing model of diffusion overstrains and various reactions the dependences of concentration overstrain on various factors have been considered.

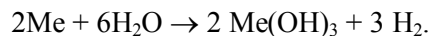
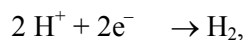
Reasoning from the electrochemical theory, the kinetic results of electrochemical water processing on metal electrodes are investigated. In systems with hydrogen isolation and accumulation ratios between current and overstrain, and also degree of surface filling with atomic hydrogen are analyzed.

From skilled data follows, those reactions in this case can proceed:

on anode



on cathode



The contribution of separated reactions at electrochemical water treating is appreciated. For quantitative estimations the weights loss of corresponding electrode and volume of isolated hydrogen on electrodes have been used. Metal output dependence on current at chemical dissolution of anode and cathode and electrochemical dissolution of anode from influence pH medium is investigated.

References

1. Matisina Z.A., Zaginaichenko S.Yu., Schur D.V. Physical phenomena and properties of crystal surface. Kiev. 2004.
2. Matisina Z.A., Zaginaichenko S.Yu., Schur D.V. The order of various types in crystals. Kiev. 2005.