DETERMINATION OF TOXIC FORMS OF MANGANESE IN WELDING AEROSOLS

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Negative anthropogenic influence on man arises from muddy water and air saturated with toxic matter. In this respect welding technologies detailed comprehensive research, as in the process of welding there is emission to the aerosol which contains a number of toxic connections. All steels, which used for the arc welding, contain Mn. Although in small doses this element enters in the complement of biocatalyst of human organism and necessary for his normal functioning, excess of Mn has neurotoxic operate and able to cause the Mn poisoning and chronic illnesses. The negative effect of Mn increases with increasing its oxidation state. That is why a study question about the concentration of different forms of Mn in welding aerosols is a necessary condition for the improvement terms of welders and workers of contiguous professions. For research of phase and element composition of hard remain of welding aerosols (HRWA) are used the spectroscopic, diffraction and resonance analytical methods. As a result of XRF analysis maintenance of Mn in an aerosol, formed at welding of basic type electrodes, hesitates in scopes from 2.5 to 8.2 mass %. Research of hard remain of welding smoke by X-ray diffraction method is complicated as a result of very small sizes of component aerosols (0.8-1.6 μm). Today the best methods of decision this question is X-ray PES and X-ray diffraction. The information is given by these methods specify that the most probable oxidation state of Mn in welding fume is Mn²⁺ and Mn³⁺ in the spinel form. However, results of welding fumes studied do not exclude the probability of Mn compound formation with a higher oxidation state for various welding conditions. By the EPR method was proved existence of two phases in all welding fumes: ferromagnetic and paramagnetic. The ferromagnetic in the basis consists of Mn³⁺Fe³⁺O₄, and paramagnetic as a result of amorphousness not subject a diffraction analysis. Common amount of oxides of Mn(III) and Mn(IV), as the most toxic forms of Mn, in the hard remain of welding aerosols determined the method of ox.-red. titration with the use in quality the repairer of sorrel acid. Although this method is often used in the all laboratories of factories, it is not marked high exactness. It is set by us, that the presence of Fe(III) as spinel of Mn²⁺Fe³⁺O₄ in the ferromagnetic constituent of welding fume results in a partial vagueness at the use of this method in the analyses of common amount of oxides of Mn(III) and Mn(IV). For determining the common amount of Mn(III) and Mn(IV) more precisely is a method of remaining ox.-red. titration with the use in quality the repairer of salts Fe(II), as at its use the presence of Fe(III) in the standards of aerosols does not influence accuracy. It is proved that separate determination of amount each of oxides (MnO, Mn₂O₃, MnO₂) in the hard remain of welding aerosols it is possible to conduct a XRF after their previous division, namely: MnO to withdraw at heating by 6 N (NH₄)₂SO₄, then Mn₂O₃ to separate solution of H₂PO₃ in concentrated H₂SO₄, and MnO₂ to determine in a hard remain after the separation of lower oxides.