

4.6. Chemical compound layer in various reaction couples: short conclusions

1. The growth rate of the layer of any chemical compound in reaction couples consisting of one of elementary substances A or B and another compound of a multiphase binary system or of two other compounds, is higher than the rate of its growth between pure components, provided that this layer is the only one in all the reaction couples under comparison.
2. The closer the compositions of the initial phases of a given reaction couple, the greater is the layer-growth rate compared to that in the A – B reaction couple.
3. The ratio of the rates of diffusional (parabolic) growth of the same compound layer in different reaction couples can be predicted precisely knowing only the stoichiometry of all the compounds of a multiphase binary system. In this case, the Wagner and physicochemical approaches yield identical results which are in good agreement with the available experimental data.
4. The physicochemical approach allows also certain exact predictions regarding the layer-growth rate in the linear region to be made, whereas in the framework of the Wagner approach the linear growth cannot be explained even qualitatively.
5. If diffusion of one of the components prevails in the growing layer of a chemical compound, then in the reaction couples consisting of one of other compounds of a multiphase system and the non-diffusing component or of two other compounds this layer must be expected to have a duplex structure. Its sublayers will differ by the shape, size or orientation of their grains.