

**Thermodynamics, isochemical and pseudobinary systems: applications to some practical problems including the atmospheric CO<sub>2</sub> budget**

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Thermodynamic data sets and computer programs are widely used for solving specific petrological problems. Here we present some examples of calculations which gives answers to more general questions, or illustrate how seemingly unexpected phenomenon faced in the field, thin sections etc. could actually be the expected ones.

Phase equilibria and mineral composition in dolomite marble – silica and peridotite systems are calculated in the presence of binary CO<sub>2</sub>-H<sub>2</sub>O fluid. Flow of silica bearing H<sub>2</sub>O rich fluid at constant P and T into the dolomite marble would cause mineralogical changes identical to those observed in the field occurrences. On the other hand, similar fluid is capable to transform peridotite to soapstone. Because both reaction series are relatively common and take place widely in field occurrences without any geological or structural relationship, we conclude that pervasive flow of water rich carbon dioxide bearing fluid through the whole crust cannot be excluded. This would have serious effect on the atmospheric CO<sub>2</sub> balance and should not be neglected from climate models. Phase equilibria and mineral composition of pelitic schists as function of excess oxygen are calculated. The results are consistent with natural assemblages suggesting that intensive oxidation took place in some shear system. Observed mineralogical changes could be explained by autoxidation by water resulting in the increased hydrogen content of the fluid. This will change the compatibility of metal complexes e.g. AuCl<sub>2</sub><sup>-</sup> and Au(HS)<sub>2</sub><sup>-</sup> in the fluid and could be one reason for the generation of shear zone hosted ore deposits, regardless of the carrier species of gold. Phase equilibria calculation of generation and crystallization of silicate liquids indicates that peritectic reactions are to be expected to happen in some siliceous systems. Generation of corundum during melting of silica saturated pelite has consequence for gemstone exploration while crystallization of interstitial orthoclase during subsolidus cooling is a warning example of wrong petrographic interpretation of intergranular phases. Natural examples, consistent with the calculation are presented.