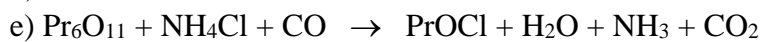
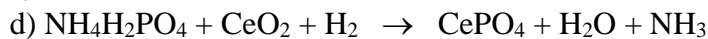
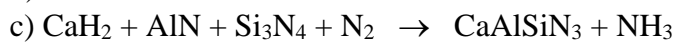
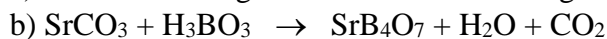
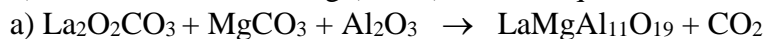


Exercises: Stoichiometry in Solid State Chemistry

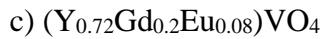
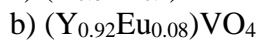
1) Calculate the elemental composition in mass percent, i.e. the theoretical elemental analysis of the blue pigment $\text{KFe}[\text{Fe}(\text{CN})_6]$ as well as of the blue emitting phosphor $\text{Sr}_5(\text{PO}_4)_3\text{Cl}:10\%\text{Eu}^{2+}$!

2) How many moles of La, Ce, Tb, P and O comprise 100 kg of $\text{LaPO}_4:\text{Ce}^{3+}(10\%)\text{Tb}^{3+}(30\%)$?

3) Establish the following (redox)reaction equations!

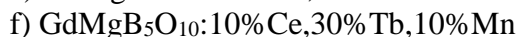
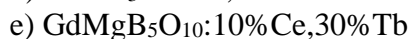
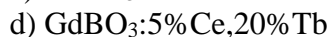
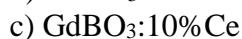
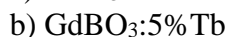
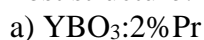


4) Calculate the amount of educts to be weighed for the synthesis of 10 g of the following PDP phosphors! Use oxides as educts, only (Ln_2O_3 , V_2O_5 , P_2O_5)!



Comment: No redox reaction takes place for these reactions!

5) Calculate the amount of educts to be weighed for the synthesis of 5 g of the following compounds! Use the following educts, only: MgO , Ln_2O_3 , CeO_2 , Pr_6O_{11} , Tb_4O_7 , H_3BO_3 , MnCO_3 ! Take into account the charge and size of the dopants when substituting cations in the host structure!



Comment: During these reactions redox processes take place, with CO acting as a reducing agents!

6) Establish the reaction equation for the synthesis of $\text{Y}_3\text{Al}_5\text{O}_{12}$ (YAG) doped with 2% Ce^{3+} , 20% Gd^{3+} and 0.1% Pr^{3+} and calculate the amount of educts needed to prepare 100 g of this LED phosphor! The synthesis consumes H_2 in order to establish a reducing atmosphere!