Synthesis, $P - T$ phase diagram, and $T_c$ of $R_2Ba_4Cu_7O_{15}$ ($R =$ Dy, Y, DyY, GdY) $^1$ SEYED AHMAD SABOK-SAYR, BOGDAN DABROWSKI, STANISLAW KOLESNIK, Department of Physics, Northern Illinois University — The oxygen pressure - temperature phase diagrams of $R_2Ba_4Cu_{15}$ ($R =$ Dy, Y, Er, DyY, GdY, and EuY) superconductors have been investigated in the temperature range between 850 and 1025$^\circ$C and the pressure range between 1 and 50 atm. $O_2$. The relative fraction of the phases: 123, 124, and 247, was determined by studying the intensity of the x-ray diffraction peaks of each phase. The condition at which the phase pure 247 exists was determined to be $P = 10$ atm and $T = 1025^\circ$C. Under these conditions samples with larger size $R =$ LaY, NdY, SmY, and Eu fail to form pure 247 phase. Annealing at $P = 200$ atm.$O_2$ and 400$^\circ$C was used to increase oxygen content of the as-synthesized materials and to induce superconductivity. The highest transition temperatures of 70K were observed for $R =$ Y compositions.

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