Phase diagram of pressure-induced superconductor $\beta$-(BDA-TTP)$_2MX_4$ ($M$=Fe, Ga and $X$=Cl, Br) with localized magnetic moments$^1$ E.S. CHOI, D. GRAF, T. TOKUMOTO, J.S. BROOKS, NHMFL/Florida State Univ., JUN-ICHI YAMADA, University of Hyogo — We have investigated transport and magnetization properties of $\beta$-(BDA-TTP)$_2MX_4$ ($M$=Fe, Ga and $X$=Cl, Br) as a function of pressure, temperature and magnetic field. The title material undergoes metal-insulator transitions above 100 K at ambient pressure. The insulating phase is suppressed with pressure and superconductivity eventually appears above $P_c$= 4.5 kbar ($X$=Cl) and 13 kbar ($X$=Br). The general temperature-pressure ($TP$) phase diagram is similar each other, while higher pressure is required for $X$=Br compounds to suppress the insulating state and induce the superconductivity. Pressure dependent DC magnetization studies on $\beta$-(BDA-TTP)$_2$FeCl$_4$ compound revealed that the AFM ordering persist well above $P_c$. In spite of similarity of phase diagram between $M$=Fe and $M$=Ga compounds, magnetoresistance results show distinct behaviors, which indicates the magnetic interaction with the conduction electrons are still effective. The comparison between $X$=Cl and $X$=Br compounds suggests the anion-size effect rather than the existence of localized magnetic moments plays more important role in determining the ground state.

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