Supplementary Information for the paper entitled

"Pressure-induced superconductivity of the Ac-B-H hydrides"

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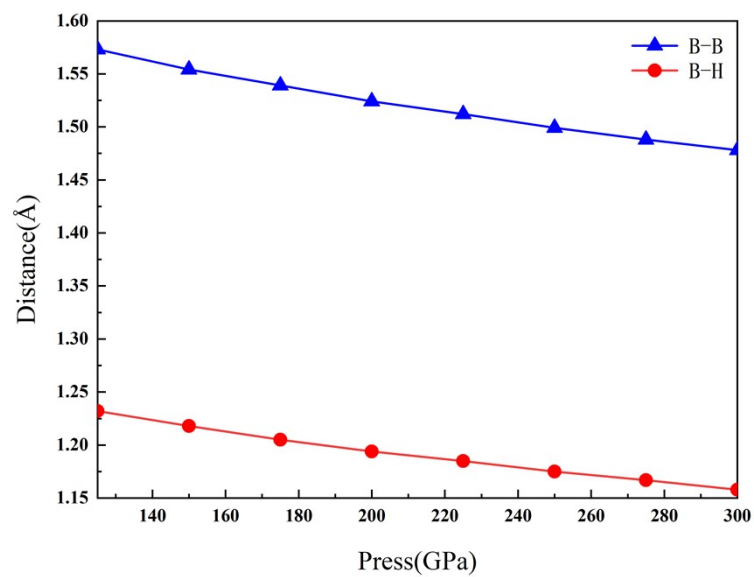*Corresponding author. Email: wencailu@jlu.edu.cn; yangwh@qdu.edu.cn.

Fig. S1. The distance between B-B and B-H at different pressures for the predicted structure $I4/mmm$-AcB$_2$H$_8$.
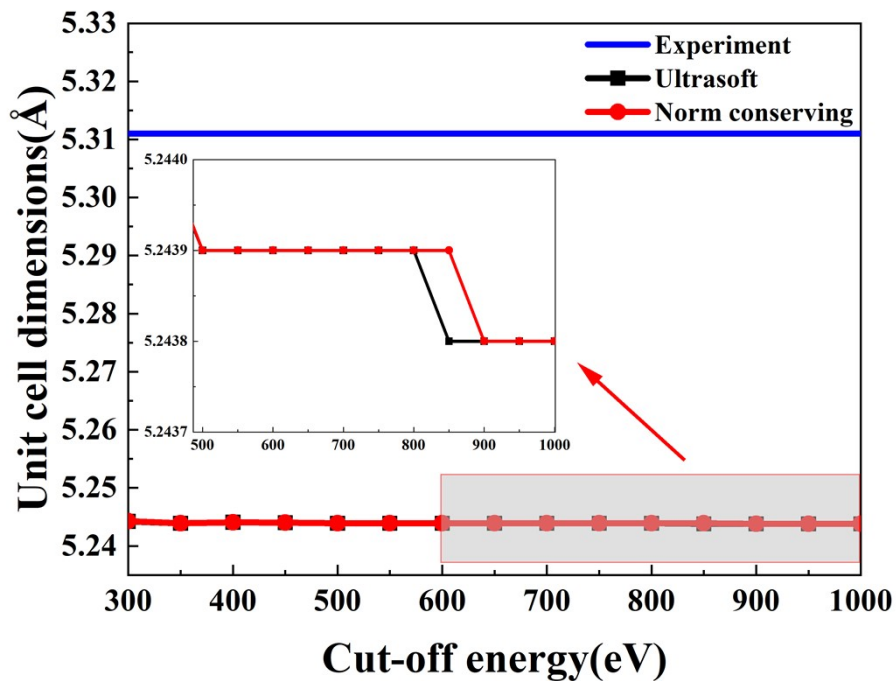
Fig. S2. Calculated lattice parameter of bulk Ac at 0 K and ambient pressure using ultrasoft pseudopotential (black line) and norm-conversing pseudopotential (red line), which were compared with the experimental data of bulk Ac (blue line).
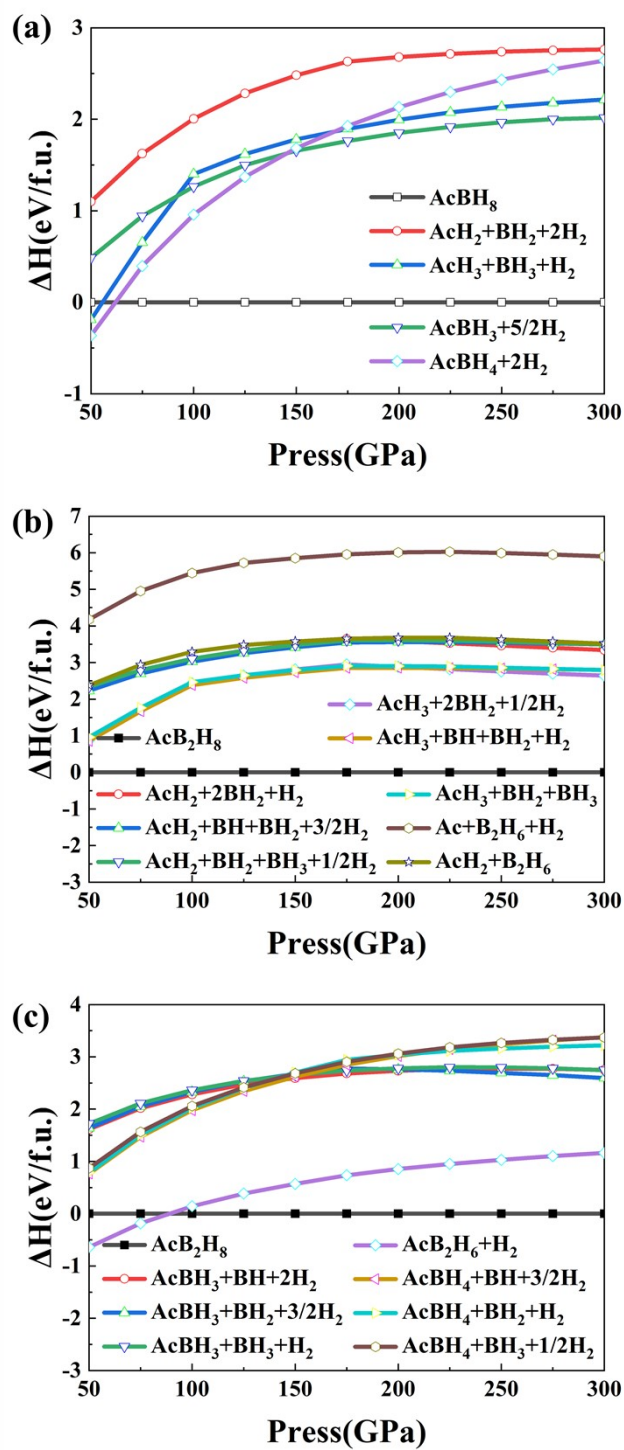
Fig. S3. (a) Enthalpy difference curves of $R\overline{3}m$-AcBH$_8$ at different pressures, (b) and (c) Enthalpy difference curves of $I4/mmm$-AcB$_2$H$_8$ at different pressures.

Table S1. Lattice parameters and atomic fractional coordinates of the AcB_mH_n (m = 1-3 and n = 3-12) structures.

Space group Press	Lattice parameters	Atomic coordinates (fractional)				Sites
$R3m$ AcBH$_3$ 100GPa	a = 4.5338 b = 4.5338 c = 5.5462	H B Ac	0.07484 -0.66667 -1.33333	-0.53742 -1.33333 -1.66667	-0.04419 0.16718 0.34860	9b 3a 3a
$R3m$ AcBH$_4$ 70GPa	a = 3.6645 b = 3.6645 c = 10.4031	H H B Ac	-0.31982 -0.33333 0.33333 0.00000	-0.15991 0.33333 0.66667 1.00000	-0.09259 -0.19568 -0.13817 -0.29275	9b 3a 3a 3a
$R3m$ AcBH$_5$ 150GPa	a = 3.8705 b = 3.8705 c = 7.9815	H H H B Ac	0.01513 0.00000 0.33333 0.33333 0.00000	-0.49244 0.00000 -0.33333 -0.33333 0.00000	-0.06932 -0.08649 0.13771 -0.00966 -0.18217	9b 3a 3a 3a 3a
$R\bar{3}m$ AcBH$_8$ 70GPa	a = 4.1663 b = 4.1663 c = 9.2796	H H B Ac	-0.17102 -0.66667 -0.33333 0.00000	0.65796 0.66667 0.33333 0.00000	-0.23366 -0.07348 -0.16667 0.00000	18h 6c 3b 3a
$Imm2$ AcB$_2$H$_6$ 125GPa	a = 6.7790 b = 3.8116 c = 3.3085	H H B Ac	0.30427 0.35409 0.61529 0.50000	0.23353 0.50000 0.50000 0.00000	0.16849 0.75217 0.12304 0.63276	8e 4c 4c 2b
$I4/mmm$ AcB$_2$H$_8$ 125GPa	a = 3.6792 b = 3.6792 c = 6.7313	H B Ac	-0.50000 -0.50000 0.00000	0.17851 0.50000 1.00000	0.33210 0.38314 0.50000	16n 4e 2b