A large number of low-level methane in underground drainage Coal Bed Methane (CBM) is directly released into the atmosphere, resulting in great energy waste and serious environmental pollution. Facing this problem, this paper focused on separating and concentrating methane (CH$_4$) gas from CBM with hydrate formation technology. Under laboratory conditions, the experiments were carried out in the temperature range of (279.15 to 283.15) K, the pressure range of (0.71 to 3.14) MPa and in the aqueous solution with added thermodynamic promoter tetrahydrofuran (THF) 6mol%. The results show that through the single-stage hydrate separation reaction, CH$_4$ fraction can be increased by 20 percentage compared with the raw gas (CH$_4$: 46.25 mol%). At 281.15K, 1.11 MPa, 80 gas-liquid ratio, the CH$_4$ in the hydrate phase can be concentrated up to 70% and the recovery of CH$_4$ is 79%. Thus, THF hydrate solution is effective in the separation and purification of Coal Bed Methane.