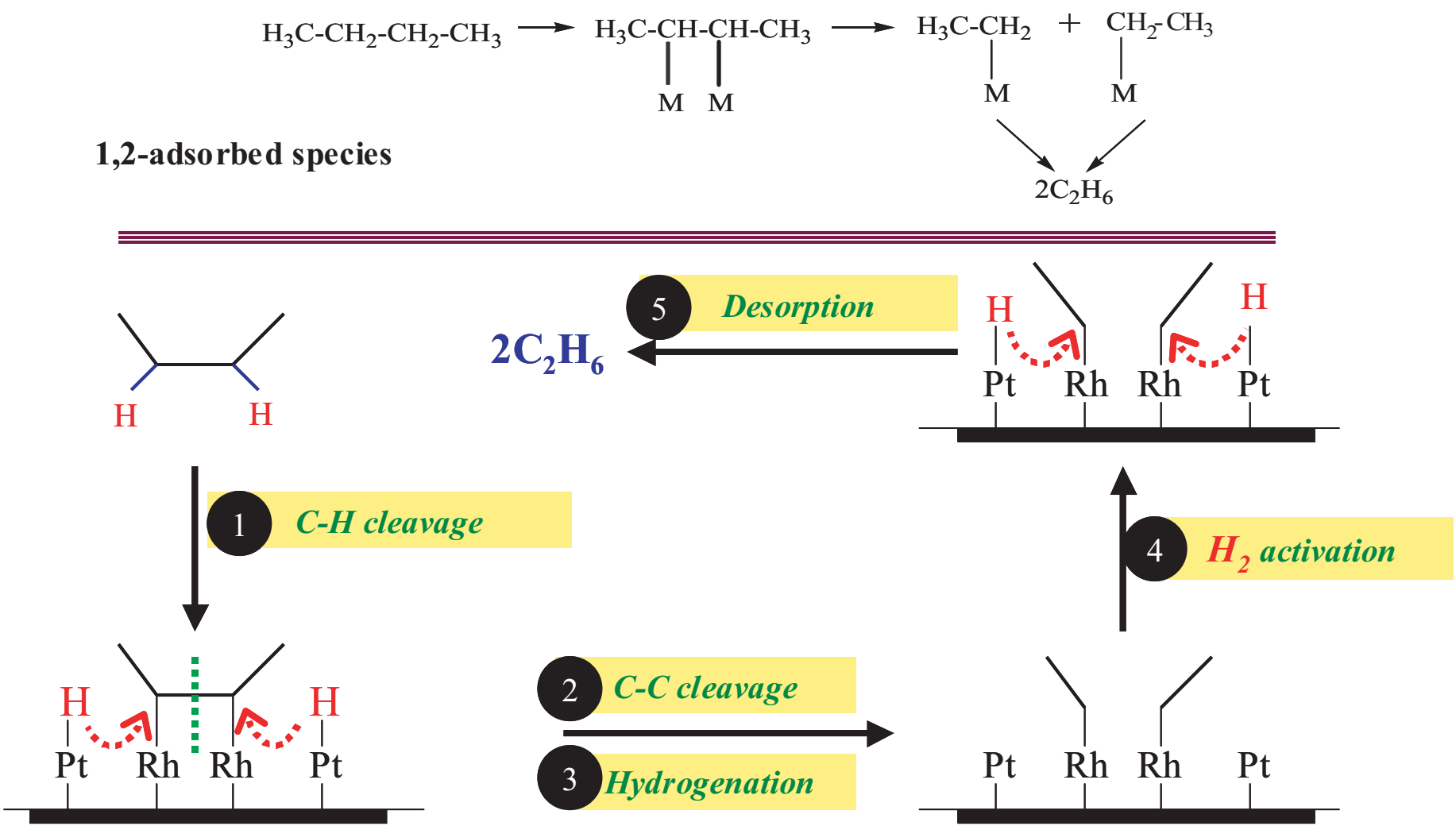Scheme 1s. 1,2-adsorbed mechanism for hydrogenolysis of butane