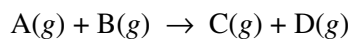
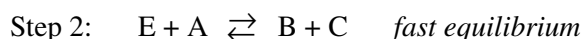
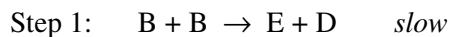


2008 AP[®] CHEMISTRY FREE-RESPONSE QUESTIONS (Form B)

2. For the gas-phase reaction represented above, the following experimental data were obtained.

Experiment	Initial [A] (mol L ⁻¹)	Initial [B] (mol L ⁻¹)	Initial Reaction Rate (mol L ⁻¹ s ⁻¹)
1	0.033	0.034	6.67×10^{-4}
2	0.034	0.137	1.08×10^{-2}
3	0.136	0.136	1.07×10^{-2}
4	0.202	0.233	?

- (a) Determine the order of the reaction with respect to reactant A . Justify your answer.
- (b) Determine the order of the reaction with respect to reactant B . Justify your answer.
- (c) Write the rate law for the overall reaction.
- (d) Determine the value of the rate constant, k , for the reaction. Include units with your answer.
- (e) Calculate the initial reaction rate for experiment 4.
- (f) The following mechanism has been proposed for the reaction.



Provide two reasons why the mechanism is acceptable.

- (g) In the mechanism in part (f), is species E a catalyst, or is it an intermediate? Justify your answer.