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Consider the radical reaction of methane, CH_4, with Iodine, I_2. The overall reaction and the two propagating steps are shown below.

Use the table of bond dissociation energies to determine which of the following set of statements is true.

$$CH_4 + I_2 \xrightarrow{h\nu} CH_3I + HI \qquad \Delta H_{reaction} = ?$$

$$CH_4 + I^{\bullet} \longrightarrow {}^{\bullet}CH_3 + HI \qquad \Delta H_1 = ?$$

$${}^{\bullet}CH_3 + I_2 \longrightarrow CH_3I + I^{\bullet} \qquad \Delta H_2 = ?$$

Bond	Dissociation E (kJ/mol)
CH_3-H	440
CH_3-I	240
H-I	298
I-I	151

- **(A)** ΔH_1 is positive; ΔH_2 is positive; $\Delta H_{reaction}$ is positive
- **(B)** ΔH_1 is positive; ΔH_2 is negative; $\Delta H_{reaction}$ is positive
- **(C)** ΔH_1 is positive; ΔH_2 is negative ; $\Delta H_{reaction}$ is negative
- **(D)** ΔH_1 is negative; ΔH_2 is positive; $\Delta H_{reaction}$ is positive
- **(E)** ΔH_1 is negative; ΔH_2 is positive; $\Delta H_{reaction}$ is negative

○ **(F)** ΔH_1 is negative; ΔH_2 is negative; $\Delta H_{reaction}$ is negative

VIDEO SOLUTION

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