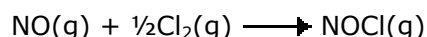


Exercise 5.41 – Activation energy

Q541-01 The rate of a chemical reaction approximately doubles when its temperature is raised from 25°C to 35°C because:

- A. the fraction of molecules with energy greater than the activation energy has increased dramatically.
- B. the activation energy for the reaction has been lowered.
- C. a very few molecules have energy greater than the activation energy.
- D. all the molecules have a little more energy.

Q541-02 The enthalpy change for the formation of one mole of nitrosyl chloride, $\Delta H = -38$ kJ.



The activation energy for this reaction is 62 kJ. The activation energy for the reverse reaction is:

- A. 38 kJ.
- B. 62 kJ.
- C. 76 kJ.
- D. 100 kJ.

Q541-03 The activation energy for the exothermic reaction: $\text{NO(g)} + \text{O}_3\text{(g)} \longrightarrow \text{NO}_2\text{(g)} + \text{O}_2\text{(g)}$ is 10.5 kJ. The activation energy for the reverse reaction is:

- A. Greater than 10.5 kJ.
- B. The same, 10.5 kJ.
- C. Less than 10.5 kJ.
- D. -10.5 kJ.

Q541-04 If the activation energy in the forward direction of an elementary step is 52 kJ and the activation energy in the reverse direction is 74 kJ, what is the energy of reaction ΔE for this step?

- A. 22 kJ
- B. -22 kJ
- C. 52 kJ
- D. -52 kJ
- E. 126 kJ

Q541-05 Given that a reaction absorbs energy and has an activation energy of 50 kJ/mol, which of the following statements are **correct**?

1. The reverse reaction has an activation energy equal to 50 kJ/mol.
2. The reverse reaction has an activation energy less than 50 kJ/mol.
3. The reverse reaction has an activation energy greater than 50 kJ/mol.
4. The change in internal energy is less than zero.
5. The change in internal energy is greater than zero.

- A. (1) and (4)
- B. (2) and (4)
- C. (3) and (4)
- D. (2) and (5)
- E. (3) and (5)

Exercise 5.41 – Activation energy

Q541-06 For the reversible reaction: $2\text{NH}_3(\text{g}) \rightleftharpoons \text{N}_2(\text{g}) + 3\text{H}_2(\text{g})$; $\Delta H = -92 \text{ kJ}$ and the activation energy equals 335 kJ. The activation energy for the reverse reaction will be:

- A. -335 kJ
- B. 92 kJ
- C. 243 kJ
- D. 427 kJ

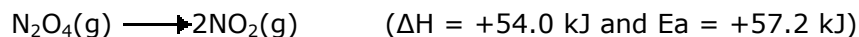
Q541-07 If the activation energy of an endothermic reaction is 40 kJ, the activation energy for the reverse reaction is:

- A. -40 kJ
- B. 40 kJ
- C. >40 kJ
- D. <40 kJ

Q541-08 A certain reaction has a $\Delta H = -75 \text{ kJ}$ and an activation energy of 40 kJ. A catalyst is found that lowers the activation energy of the forward reaction by 15 kJ. What is the activation energy of the reverse reaction in the presence of this same catalyst?

- A. 25 kJ
- B. 60 kJ
- C. 90 kJ
- D. 100 kJ

Q541-09 What is the activation energy for the reverse of the reaction below?



- A. -54.0 kJ
- B. +3.2 kJ
- C. +60.2 kJ
- D. +111.2 kJ

Q541-10 In each of the following potential energy diagrams, the horizontal axis is the reaction coordinate and the vertical axis is potential energy in kJ. Which potential energy diagram best describes a reaction which has an activation energy of 40 kJ and a net energy change (reaction enthalpy) of -100 kJ?

