

Example of Answers

International Master's Programs of Chemical Engineering in the Graduate School of Engineering, Kyushu University (Academic Year from October, 2026)

Subject : Basic Chemistry (1 sheet)

1

(1.1)

$$\Psi_n(x) = \sqrt{\frac{2}{L}} \sin\left(\frac{n\pi x}{L}\right)$$

(1.2)

$$E_n = \frac{n^2 \pi^2 \hbar^2}{2mL^2} \quad (n=1, 2, 3 \dots)$$

(1.3)

$$\frac{1}{4} - \frac{1}{2\pi}$$

(1.4)

$$\int_0^L \Psi_1(x) \Psi_3(x) dx = \frac{2}{L} \int_0^L \sin\left(\frac{\pi x}{L}\right) \sin\left(3\frac{\pi x}{L}\right) dx = 0$$

2.

(2.1)

0 (racemic)

In S_N1 reactions, an intermediate carbocation is formed, resulting in the production of equal proportions of S and R isomers sterically.

(2.2) constant

$$v = k[(S)\text{-}3\text{-bromo-}3\text{-methyl hexane}]$$

v is determined only by the starting substance of (S)-3-bromo-3-methyl hexane

3.

(3.1)



(3.2)

