

Question 6: Short Answer**4 points**

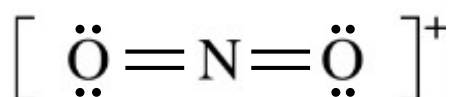
(a) For a correct explanation: **1 point**

The plot of $\frac{1}{[\text{NO}_2]}$ versus time is the most linear, indicating that the reaction is second order with respect to NO_2 .

(b) For the correct calculated value: **1 point**

$$6.52 \times 10^{-7} \text{ M/s} \times \frac{1 \text{ mol O}_2}{2 \text{ mol NO}_2} = 3.26 \times 10^{-7} \text{ M/s}$$

(c) (i) For the correct Lewis diagram: **1 point**



(ii) For the correct answer and a valid justification, consistent with part (c)(i): **1 point**

Accept one of the following:

- *Agree. The angle of NO_2^+ is different from the angle in NO_2 because there would no longer be a nonbonding electron on the central atom in NO_2 , and the O atoms would spread farther apart, forming a linear structure with a 180° bond angle.*
- *Agree. The hybridization of N in NO_2 is sp^2 , which would result in a bond angle of approximately 120° . The hybridization of N in NO_2^+ is sp , which would result in a bond angle of 180° .*

Total for part (c) 2 points

Total for question 6 4 points