

Order of Reaction Answers

1. change in concentration of reactants or products per unit time
2. a) first with respect to A, second with respect to B
b) 3
c) $250 \text{ mol}^{-2}\text{dm}^6\text{s}^{-1}$
d) $2.5 \times 10^{-4} \text{ mol dm}^{-3}\text{s}^{-1}$
3. $8.3 \times 10^{-3} \text{ mol}^{-1}\text{dm}^3\text{s}^{-1}$
rate determining step does not involve hydrogen
4. rate = $k[\text{PCl}_3][\text{Cl}_2]^2$ $k = 1.05 \times 10^{-3} \text{ mol}^{-2}\text{dm}^6\text{s}^{-1}$
5. $2.00 \text{ mol}^{-2}\text{dm}^6\text{s}^{-1}$
6. rate = $k[\text{H}_2][\text{NO}]^2$ $k = 8.3 \times 10^4 \text{ mol}^{-2}\text{dm}^6\text{s}^{-1}$

7. a) will increase
greater collision energy
so greater chance of activation energy being exceeded
so greater fraction of successful collisions
k increases
b) will increase
more particles per unit volume
so collision frequency increases
k unchanged
c) will increase
more particles per unit volume
so collision frequency increases
k unchanged
d) will increase
alternative reaction pathway
so lower activation energy
so greater fraction of successful collisions
(k increases unless catalyst in rate equation in which case k unchanged)