

G12 Chemistry: Class 9 Homework

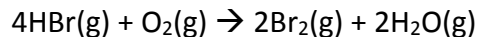
1. Cyclopropane, C_3H_6 is used in the synthesis of organic compounds and as a fast-acting anaesthetic. It undergoes rearrangement to form propene, C_3H_6 . If cyclopropane disappears at a rate of $0.25 \text{ mol/L}\cdot\text{s}$, at what rate is propene being produced? **[1 mark]**

2. Ammonia NH_3 reacts with oxygen to produce nitric oxide, NO , and water vapour.



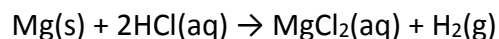
At a specific time in the reaction, ammonia is disappearing at rate of $0.068 \text{ mol/L}\cdot\text{s}$. What is the corresponding rate of production of water? **[2 marks]**

3. Hydrogen bromide reacts with oxygen to produce bromine and water vapour.



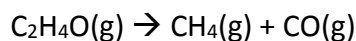
How does the rate of decomposition of HBr (in $\text{mol/L}\cdot\text{s}$) compare with the rate of formation of Br_2 (also in $\text{mol/L}\cdot\text{s}$)? Express your answer as an equation. **[1 mark]**

4. Magnesium metal reacts with hydrochloric acid to produce magnesium chloride and hydrogen gas. Over an interval of 1.00s, the mass of Mg(s) changes by -0.011 g.



- a) What is the corresponding rate of consumption of HCl(aq) (in mol/s)? **[3 marks]**
- b) Calculate the corresponding rate of production of H₂(g) (in L/s) at 20°C and 101 kPa. **[3 marks]**

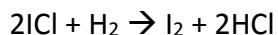
5. When heated, ethylene oxide decomposes to produce methane and carbon monoxide.



At 415°C, the following initial rate data were recorded. Determine the rate law equation and the rate constant at 415°C. **[4 marks]**

Experiment	[C ₂ H ₄ O] ₀ (mol/L)	Initial Rate (mol/ L•s)
1	0.00285	5.84 x 10 ⁻⁷
2	0.00428	8.76 x 10 ⁻⁷
3	0.00570	1.17 x 10 ⁻⁶

6. Iodine chloride reacts with hydrogen to produce iodine and hydrogen chloride.



At temperature T, the following initial rate data were recorded. Determine the rate law equation and the rate constant at temperature T. **[5 marks]**

Experiment	[ICl] ₀ (mol/L)	[H ₂] ₀ (mol/L)	Initial Rate (mol/ L•s)
1	0.20	0.050	0.0015
2	0.40	0.050	0.0030
3	0.20	0.200	0.0060

6. Sulfuryl chloride, SO₂Cl₂ is used in a variety of applications, including the synthesis of pharmaceuticals, rubber-based plastics, dyestuff and rayon. At a certain temperature, the rate of decomposition of sulfuryl chloride was studied. **[4 marks]**



Experiment	[SO ₂ Cl ₂] (mol/L)	Initial rate (mol/ L•s)
1	0.150	3.3 x 10 ⁻⁶
2	0.300	6.6 x 10 ⁻⁶
3	0.450	9.9 x 10 ⁻⁶

- Write the rate law equation for the decomposition of sulfuryl chloride.
- Determine the rate constant, k, for the reaction with the appropriate units.