Chemistry 12

Reaction Rates Worksheet

Name:
Date:
Block:

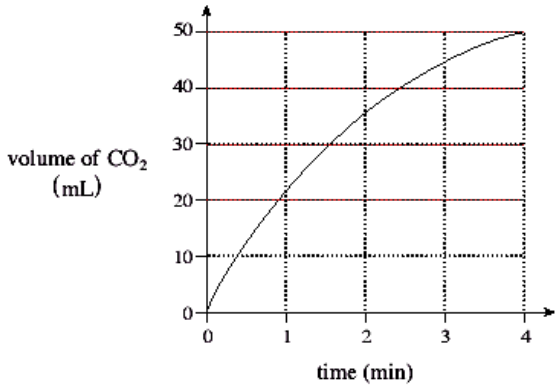
1. Given the reaction: $N_{2(g)} + 3\ H_{2(g)} \rightarrow 2\ NH_{3(g)}$

If the rate of formation of NH_3 is 8.0×10^{-3} mol/s, calculate the rate of consumption of H_2 in mol/s.

2. Given the reaction: $2Al_{(s)} + 6HCl_{(aq)} \rightarrow 3H_{2(g)} + 2AlCl_{3(aq)}$

If the rate of production of H_2 is 5.50 L/min at STP, calculate the rate of consumption of Al in g/min.

3. Given the following reaction and graph: $CaCO_{3(s)} + 2\ HCl_{(aq)} \rightarrow CaCl_{2(aq)} + CO_{2(g)} + H_2O_{(l)}$



a) Calculate the average rate of reaction in mL CO_2 /min for the time interval 0 – 2 min.

b) Calculate the average rate of reaction in mL CO_2 /min for the time interval 2 – 4 min.

4. Consider the following reaction:

$2H_2O_{2\,(l)} \rightarrow 2\,H_2O_{(l)} + O_{2(g)}$

If the rate of consumption of H_2O_2 is 0.020 g/s, calculate the rate of production of O_2 in mol/min.

5. Consider the following reaction: $Zn_{(s)} + 2HCl_{\,(aq)} \rightarrow ZnCl_{2\,(aq)} + H_{2(g)}$

Outline 3 procedures you could use to **monitor** the rate of this reaction.

i.

ii.

iii.

6. Given the reactions:

a) $2Ag^{+}_{\,(aq)} + CrO_4^{2-}{}_{(aq)} \rightarrow Ag_2CrO_{4\,(s)}$

b) $Pb_{\,(s)} + 2HCl_{\,(aq)} \rightarrow PbCl_{2\,(aq)} + H_{2(g)}$

Which reaction would be faster at room temperature? _____. Explain your answer.

7. Given the same conditions, which of the following reactions is fastest?

a. $H_{2(g)} + I_{2(g)} \rightarrow 2HI_{(g)}$

b. $Ag^{+}_{(aq)} + I^{-}_{(aq)} \rightarrow AgI_{\,(s)}$

c. $C_6H_{12}O_{6\,(s)} + 6\,O_{2(g)} \rightarrow 6\,CO_{2(g)} + 6\,H_2O_{(g)}$

d. $5\,C_2O_4^{2-}{}_{(aq)} + 2\,MnO_4^{2-}{}_{(aq)} + 16\,H^{+}_{(aq)} \rightarrow 10\,CO_{2(g)} + 2\,Mn^{2+}{}_{(aq)} + 8\,H_2O_{(l)}$

Explain your answer.

8. Consider the reaction: $Sn_{(s)} + 2\,HCl_{(aq)} \rightarrow H_{2(g)} + SnCl_{2(aq)}$

Give 4 methods by which the rate of this reaction could be increased.

i.

ii.

iii.

iv.

9. . Which of the following reactions will be **slowest** at 25°C?

I. $Cu_{(s)} + S_{(s)} \rightarrow CuS_{(s)}$
II. $H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O_{(l)}$
III. $Pb^{2+}_{(aq)} + 2Cl^-_{(aq)} \rightarrow PbCl_{2(s)}$
IV. $2NaOCl_{(aq)} \rightarrow 2NaCl_{(aq)} + O_{2(g)}$

10. Give **two** procedures which could be used to speed up the reaction you identified in the above question.

i.

ii.