

Name \_\_\_\_\_

Date \_\_\_\_\_

Due Date \_\_\_\_\_

Mark \_\_\_\_\_/36

*Correct and Hand in Again by* \_\_\_\_\_**Chemistry 12****Hand In Assignment #2 – Reaction Rates****This Assignment will be marked and you are allowed to do one set of corrections.**

- Given the reaction:  $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l})$ , explain why this reaction is very slow at room temperature. (1 mark)
- Given the reaction:  $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$ , explain why this reaction is very slow at room temperature. (1 mark)
- Given the reactions: a)  $2\text{Ag}^+(\text{aq}) + \text{CrO}_4^{2-}(\text{aq}) \rightarrow \text{Ag}_2\text{CrO}_4(\text{s})$  and  
b)  $\text{Pb}(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{PbCl}_2(\text{aq}) + \text{H}_2(\text{g})$

Which reaction would be faster at room temperature? \_\_\_\_\_ (1 mark)

Explain your answer. (1 mark)

- Given the reaction:  $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$

If the rate of formation of  $\text{NH}_3$  is  $8.0 \times 10^{-3}$  mol/s, calculate the rate of consumption of  $\text{H}_2$  in mol/s. (2 marks)

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Answer \_\_\_\_\_

5. Given the reaction:  $2\text{Al}_{(s)} + 6\text{HCl}_{(aq)} \rightarrow 3\text{H}_{2(g)} + 2\text{AlCl}_{3(aq)}$   
 If the rate of production of  $\text{H}_2$  is 5.50 L/min, calculate the rate of consumption of Al in g/min. (3 marks)

Answer \_\_\_\_\_

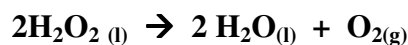
6. At 25°C, which of the following reactions is fastest? (1 mark)

- a.  $\text{H}_{2(g)} + \text{I}_{2(g)} \rightarrow 2\text{HI}_{(g)}$   
 b.  $\text{Ag}^+_{(aq)} + \text{I}^-_{(aq)} \rightarrow \text{AgI}_{(s)}$   
 c.  $\text{C}_6\text{H}_{12}\text{O}_6_{(s)} + 6\text{O}_{2(g)} \rightarrow 6\text{CO}_{2(g)} + 6\text{H}_2\text{O}_{(g)}$   
 d.  $5\text{C}_2\text{O}_4^{2-}_{(aq)} + 2\text{MnO}_4^{2-}_{(aq)} + 16\text{H}^+_{(aq)} \rightarrow 10\text{CO}_{2(g)} + 2\text{Mn}^{2+}_{(aq)} + 8\text{H}_2\text{O}_{(l)}$

Answer \_\_\_\_\_

Give an explanation for your answer. (1 mark)

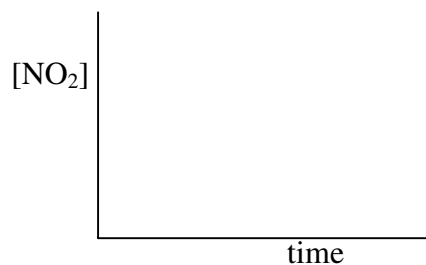
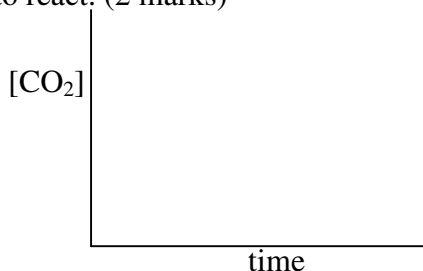
7. Consider the following reaction:



If the rate of consumption of  $\text{H}_2\text{O}_2$  is 0.020 g/s, calculate the rate of production of  $\text{O}_2$  in mol/min. (3 marks)

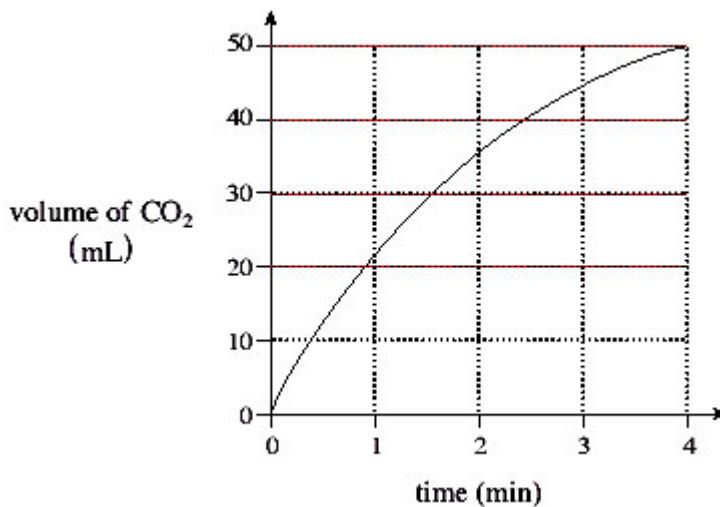
Answer \_\_\_\_\_

8. Given the reaction:  $\text{CO}_{2(g)} + \text{NO}_{(g)} \rightarrow \text{CO}_{(g)} + \text{NO}_{2(g)}$ , sketch the shapes of the curves on the following graphs assuming that some  $\text{CO}_2$  and  $\text{NO}$  is placed in a closed container and left to react. (2 marks)



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9. Given the following reaction and graph:



- a) Calculate the average rate of reaction in mL CO<sub>2</sub> /min for the time interval 0 – 2 min. (2 marks)

Answer \_\_\_\_\_

- b) Calculate the average rate of reaction in mL CO<sub>2</sub> /min for the time interval 2 – 4 min. (2 marks)

Answer \_\_\_\_\_

- c) Explain why the rate in (b) is less than the rate in (a) (1 mark)

10. Given the reaction:  $\text{Sn}_{(s)} + 2 \text{HCl}_{(aq)} \rightarrow \text{H}_{2(g)} + \text{SnCl}_{2(aq)}$

Give 4 methods by which the rate of this reaction could be increased (4 marks)

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11. Consider the following reaction:  $\text{Zn}_{(s)} + 2\text{HCl}_{(aq)} \rightarrow \text{ZnCl}_{2(aq)} + \text{H}_{2(g)}$

Outline 3 procedures you could use to **monitor** the rate of this reaction. Include the instruments you would use with your procedures. (3 marks)

12. Explain how an **inhibitor** works to decrease the rate of a chemical reaction. (1 mark)

13. Given the reaction:  $\text{H}_{2(g)} + \text{I}_{2(g)} \rightleftharpoons 2\text{HI}_{(g)}$  taking place in a closed container,

- What would happen to the rate of the forward reaction if the volume of the container is increased? (1 mark) \_\_\_\_\_
- Explain your answer to (a). (1 mark)
- What would happen to the rate of the reverse reaction if the volume of the container is increased? (1 mark) \_\_\_\_\_
- Explain your answer to (c). (1 mark)

14. a) Which of the following reactions will be **slowest** at 25°C? (1 mark)

- $\text{Cu}_{(s)} + \text{S}_{(s)} \rightarrow \text{CuS}_{(s)}$
- $\text{H}^+_{(aq)} + \text{OH}^-_{(aq)} \rightarrow \text{H}_2\text{O}_{(l)}$
- $\text{Pb}^{2+}_{(aq)} + 2\text{Cl}^-_{(aq)} \rightarrow \text{PbCl}_{2(s)}$
- $2\text{NaOCl}_{(aq)} \rightarrow 2\text{NaCl}_{(aq)} + \text{O}_{2(g)}$

Answer \_\_\_\_\_

- Give **two** procedures which could be used to speed up the reaction you identified in (a). (2 marks)