

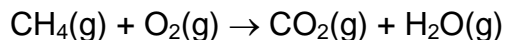
Chemistry 30

**Unit 2: Chemical Kinetics**Assignment 1: 1-1 to 1-3

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*You are required to show work for all calculations.*

1. During the combustion of methane, CH<sub>4</sub>, shown by the reaction



the concentration of methane was measured at various time intervals and the following results were obtained:

Time (s)	[CH <sub>4</sub> ] (mol · l <sup>-1</sup> )
10	2.40
20	1.20
30	0.80
40	0.60

Calculate the average rate of loss of methane during the 10 to 40 second time period.

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

If the rate of decomposition of N<sub>2</sub>(g) is 0.03 mol · L<sup>-1</sup> · s<sup>-1</sup>, what is the rate of formation of NH<sub>3</sub>(g)?

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3. Measurements taken during the reaction  $\text{CO(g)} + \text{NO}_2\text{(g)} \rightarrow \text{CO}_2\text{(g)} + \text{NO(g)}$

showed a concentration of carbon monoxide of 0.019 mol at 27 min and of 0.013 mol at 45 min. Calculate the average rate, in  $\text{mol} \cdot \text{L}^{-1} \cdot \text{min}^{-1}$  over this 18 min period, of each of the following:

a) the loss of carbon monoxide, CO

b) the gain of carbon dioxide,  $\text{CO}_2$

4. In the following reaction the average rate of loss of carbon monoxide, over a set period, is  $0.15 \text{ mol} \cdot \text{L}^{-1} \cdot \text{s}^{-1}$ .



What is the average rate of production of carbon dioxide during the same period.