

Year 11 Chemistry Assignment Chemical Equilibrium

- 1.
- (a) Draw a picture showing the difference between an open system and a closed system. /2
 - (b) Suggest why chemical equilibrium requires a fixed temperature. /1
 - (c) Describe an example of an equilibrium that is static (not dynamic). Explain why. /3

2. Consider this reversible reaction: $\text{N}_{2(g)} + 3\text{H}_{2(g)} \rightleftharpoons 2\text{NH}_{3(g)}$

- (a) The following table shows the concentrations of reactants and products in an experiment:

	N_2	H_2	NH_3
Initial concentration (mol L^{-1})	0.200	0.200	0
Final concentration (mol L^{-1})	0.157	0.072	?

Show that the missing measurement (final $[\text{NH}_3]$) is approximately 0.086 mol L^{-1} . /2

- (b) Sketch a labelled graph of concentration against time for all the species in this reaction, given that equilibrium is reached in 10 minutes. /3
- (c) Write the K_c expression for the reaction above. /1
- (d) Hence calculate the equilibrium constant K_c for this reaction. /2
- (e) Use the K_c expression to explain why the forward reaction was favoured. /3

3. When bromine is added to water, the following equilibrium forms:



The reaction can be followed by colour changes, because Br_2 is brown and all other species are colourless.

- (a) State how you would know when the reaction above has reached equilibrium. /1
- (b) Use an analogy to describe Le Chatelier's Principle. (LCP is like...) /2
- (c) Predict the colour change that would occur if the following is added to the mixture:
 - (i) Br^- /1
 - (ii) HCl /1
 - (iii) NaOH /1
- (d) Predict and explain the colour change that would occur if Br_2 is added to the mixture. /3