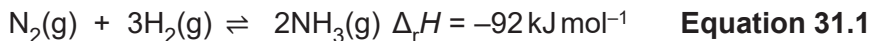


**A Level Chemistry B (Salters)**  
**H433/01** Fundamentals of chemistry

**Question Set 11**

- 1 (a) Ammonia is made by the reaction shown in **equation 31.1**.

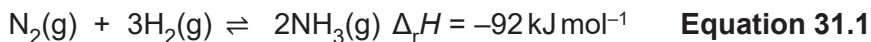


The reaction can be allowed to reach dynamic equilibrium.

Explain what is meant by **dynamic equilibrium**.

[2]

- (b) Ammonia is made by the reaction shown in **equation 31.1**.



At a certain temperature, the equilibrium constant,  $K_c$ , for the reaction in **equation 31.1** is  $3.0 \text{ dm}^6 \text{ mol}^{-2}$ .

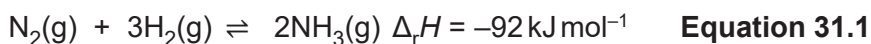
In an equilibrium mixture, the concentrations of nitrogen and hydrogen are as shown below.

Gas	Equilibrium concentration / $\text{mol dm}^{-3}$
Nitrogen	2.0
Hydrogen	1.6

Calculate the concentration of ammonia in the equilibrium mixture.

concentration of ammonia = ..... $\text{mol dm}^{-3}$  [3]

- (c) Ammonia is made by the reaction shown in **equation 31.1**.

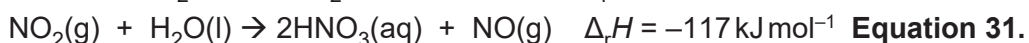


A chemist says the process would be more efficient if the ammonia produced is continuously liquefied and removed from the reaction vessel.

Comment on the Chemist's suggestion using ideas of equilibrium and the equilibrium constant.

[2]

- (d) (i) Some of the ammonia is converted to nitric acid in the sequence of reactions shown below:



A student considers the operating conditions for the reaction in **equation 31.2**.

The student recommends a **pressure** just greater than the pressure of the atmosphere and a **temperature** of 500 K in the presence of a platinum **catalyst**.

Comment on this choice of conditions.

[6]



Give the sign of  $\Delta S_{\text{sys}}$  in **equation 31.3**, with a reason.

Use this to explain whether the reaction becomes more or less feasible at higher temperatures.

**[3]**

**Total Marks for Question Set 11: 16**

---

# OCR

Oxford Cambridge and RSA

## **Copyright Information**

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website ([www.ocr.org.uk](http://www.ocr.org.uk)) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge