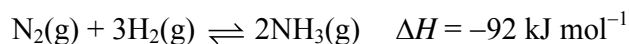


3 Nitrogen can be reacted with hydrogen in the presence of a catalyst to make ammonia in the Haber process.



(a) Describe and explain the effect of increasing the pressure on the rate of this reaction.

.....

 [2]

(b) A mixture of N₂ and H₂ was left to react until it reached equilibrium. The equilibrium mixture had the following composition:

N ₂	1.20 mol dm ⁻³
H ₂	2.00 mol dm ⁻³
NH ₃	0.877 mol dm ⁻³

(i) Calculate a value for K_c for this equilibrium.

SPECIMEN

K_c = dm⁶ mol⁻² [3]

(ii) Explain how the following changes would affect the amount of NH₃ present in the equilibrium mixture.

Use of a catalyst:

.....

A higher temperature:

.....

[3]

- (c) 1.00 tonne of ammonia from the Haber process is reacted with carbon dioxide to prepare the fertiliser urea, NH_2CONH_2 .



1.35 tonnes of urea are formed.

Calculate the percentage yield of urea.

Show **all** your working.

yield = % [3]

SPECIMEN