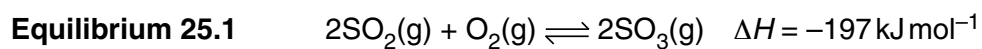


25 Sulfur trioxide, SO_3 , is used for the industrial manufacture of sulfuric acid.

SO_3 is produced by reacting sulfur dioxide, SO_2 , and oxygen, O_2 , as shown in **equilibrium 25.1** below.



(a) Le Chatelier's principle can be used to predict how different conditions affect the equilibrium position.

- Using le Chatelier's principle, show that a low temperature and a high pressure should be used to obtain a maximum **equilibrium** yield of SO_3 .
- Explain why the actual conditions used in industry may be different from the conditions needed for a maximum equilibrium yield.

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(b) Under certain conditions, K_c for **equilibrium 25.1** is $0.160 \text{ dm}^3 \text{ mol}^{-1}$.

The equilibrium mixture under these conditions has the following concentrations of SO_2 and O_2 .

Species	Equilibrium concentration / mol dm^{-3}
SO_2	2.00
O_2	1.20

- Using the value of K_c , explain whether the equilibrium position will be towards the right or towards the left under these conditions.
- Calculate the concentration of SO_3 in the equilibrium mixture.

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