AQA – Chemical equilibria, Le Chatelier's principle and Kc – AS Chemistry P2

1. June/ 2020/Paper_2/No.8

0 8 Hydrogen gas can be made by reacting ethanol with steam in the presence of a catalyst.

$$C_2H_5OH(g) + H_2O(g) \rightleftharpoons 2\,CO(g) + 4\,H_2(g)$$

0 8 . 1 Give an expression for K_c for this equilibrium.

State its units.

[2 marks]

K_c

Units of K_c _____

0 8 . 2 **Table 4** shows the amount of each substance in an equilibrium mixture in a container of volume 750 cm^3

Table 4

Substance	$C_2H_5OH(g)$	$H_2O(g)$	$CO(g)$	$H_2(g)$
Amount of substance / mol	0.0750	0.156	0.110	0.220

Calculate K_c

[3 marks]

K_c _____

0 8 . 3 The pressure of the equilibrium mixture was increased by reducing the volume of the container at constant temperature.

Predict the effect of increasing the pressure on the equilibrium yield of hydrogen. Explain your answer.

Predict the effect of increasing the pressure on the value of K_c

[4 marks]

Effect on equilibrium yield of hydrogen _____

_____

Explanation _____

_____

_____

_____

_____

_____

Effect on value of K_c _____

_____

2. June/ 2019/Paper_2/No.11

Which statement is correct for the distribution curve of molecular energies in a gas?

[1 mark]

A The curve is symmetrical about the maximum. ⬭

B There are always some molecules with zero energy. ⬭

C The position of the maximum of the curve is not dependent on the temperature. ⬭

D The mean energy of the molecules is greater than the most probable energy of the molecules. ⬭

3. June/ 2019/Paper_2/No.12

When one mole of ammonia is heated to a given temperature, 50 % of it dissociates and the following equilibrium is established.

$$NH_3(g) \rightleftharpoons \frac{1}{2}N_2(g) + \frac{3}{2}H_2(g)$$

What is the total amount, in moles, of gas in this equilibrium mixture?

[1 mark]

A 1.5 ⬭

B 2.0 ⬭

C 2.5 ⬭

D 3.0 ⬭

4. June/ 2021/Paper_2/No.14

Which statement about molecules in a gas is correct?

[1 mark]

A At a fixed temperature they all move at the same speed. ⬭

B At a fixed temperature their average kinetic energy is constant. ⬭

C As temperature increases, there are more molecules with the most probable energy. ⬭

D As temperature decreases, there are fewer molecules with the mean energy. ⬭

5. June/ 2021/Paper_2/No.18

The reaction reaches equilibrium in a container of fixed volume.

Which is the expression for K_c for this equilibrium?

[1 mark]

A $K_c = \frac{[CH_3OH]}{[CO] + [H_2]^2}$ ⬭

B $K_c = \frac{[CH_3OH]}{[CO]\,[H_2]^2}$ ⬭

C $K_c = \frac{[CO] + [H_2]^2}{[CH_3OH]}$ ⬭

D $K_c = \frac{[CO]\,[H_2]^2}{[CH_3OH]}$ ⬭

6. June/ 2021/Paper_2/No.20

Which change in condition will decrease the equilibrium yield of methanol?

[1 mark]

A Increase the amount of CO in the equilibrium mixture. ⬭

B Increase the pressure. ⬭

C Increase the surface area of the catalyst. ⬭

D Increase the temperature. ⬭