Answer keys:

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MCQs

07-1-M-01	D
07-1-M-02	C
07-1-M-03	C
07-1-M-04	B
07-1-M-05	D
07-1-M-06	B
07-1-M-07	D
07-1-M-08	D
07-1-M-09	D
07-1-M-10	A
07-1-M-11	D
07-1-M-12	D
07-1-M-13	B
07-1-M-14	B
07-1-M-15	D
07-1-M-16	C
07-1-M-17	B
07-1-M-18	B
07-1-M-19	D
07-1-M-20	C
07-1-M-21	D
07-1-M-22	A
07-1-M-23	D
07-1-M-24	D
07-1-M-25	C
07-1-M-26	D
07-1-M-27	A
07-1-M-28	C
07-1-M-29	A

Questions

07-1-Q-01

(a) 0.09, 0.21, 0.21

(b) 0.49 mol dm^{-3}

(c) reaction is endothermic since endothermic reactions are favoured by increase in temperature

(d) K_c remains unchanged

(e) 98,9; 100,6; 102,1

07-1-Q-02

(a)(i) $K_c = \frac{[H_2][I_2]}{[HI]^2}$

(ii) 3.92×10^{-4} mol dm^{-3}

(iii) 9.08×10^{-4} mol

(b) White HI fumes will decompose to form colourless hydrogen gas and purple iodine vapour

(c) 454 kPa

07-1-Q-03

(a)(i) Low pressure (1 atm) favours yield of product; Inert gas present allows an even lower pressure of C_7H_{16}; high temperature (300°C) is used to give a better yield of product

(ii) Suitable hydrogenating catalyst such as Ni

(b)(i) $C_7H_{16} = 0.0217\ P$ atm; $C_7H_8 = 0.196\ P$ atm; $H_2 = 0.783\ P$ atm

(ii) $K_p = \frac{P(C_7H_8) \times P(H_2)^4}{P(C_7H_{16})}$

(iii) 0.737 atm

(c) 1 : 3

07-1-Q-04

(a) $K_c = \frac{[SO_2Cl_2]}{[SO_2][Cl_2]}$

(b) 5.00 $mol^{-1}dm^3$; 8.33 $mol^{-1}dm^3$

(c) The forward reaction is exothermic

(d) SO_2 has been added

(e) Position of equilibrium shifts right to reduce number of gaseous molecules

07-1-Q-05

(a)(i) an increase in pressure increases the percentage yield of the product, favouring the forward reaction

(ii) an increase in temperature decreases the percentage yield of the product, favouring the backward reaction

(iii) 70%

(iv) Higher pressure may increase the percentage yield of the product

(v) By removing the products once they are formed

(b) Dynamic equilibrium refers to a state in a reversible reaction in which the rates of forward and backward reactions have become equal. Catalysts do not affect the equilibrium position; instead they alter the activation energies of both forward and backward reactions to attain equilibrium more quickly

(c)(i) 43.9%

(ii) 1.84×10^{-13} Pa^{-2}

07-1-Q-06

(a) $\frac{1}{P_{NH_3}P_{HCl}}$ atm^{-2}

(b) 0.0550 atm; 1.03 atm

(c)(i) 1.24 g

(ii) NH_3 and HC*l* are real gases

(d) By LCP, the equilibrium position shifts right to favour endothermic reaction

07-1-Q-07

(a)(i) Colour intensity is proportional to $[NO_2]$ in mixture

(ii) The initial slope is proportional to initial rate of reaction

(iii) The system has reached a state of dynamic equilibrium

(iv) The forward reaction is exothermic, as less NO_2 is produced

(b)(i) ⅓

(ii) K_p remains unchanged