



IB Chemistry – HL

Topic 7 Answers

1. D
2. D
3. A
4. B
5. D
6. D
7. D
8. No ECF throughout this question.

(a) $K_c = \frac{[\text{N}_2\text{O}_4]}{[\text{NO}_2]^2}$ 1

(b) K_c decreases;
forward reaction is exothermic/ ΔH is negative/equilibrium
moves to left/*OWTTE*; 2

(c) (mixture will get) darker/darker than expected;

equilibrium position moves to the left/towards reactants as there is an
increase in the number of moles of gas from right to left; 2

(d) (equilibrium mixture contains) less (than 2 moles NO_2);

given values make $\frac{[\text{N}_2\text{O}_4]}{[\text{NO}_2]^2} = \frac{1}{2}$ *i.e.* too much NO_2 /*OWTTE*; 2

[7]

9. (a) (i) no effect;
equal gas moles on each side; 2

(ii) shift to right;
forward reaction absorbs heat/endothermic/*OWTTE*; 2

(iii) no effect;
catalyst speeds up both forward and reverse reactions equally; 2

(b) $K_c = \frac{[\text{H}_2][\text{I}_2]}{[\text{HI}]^2}$; 1

Ignore state symbols.

(c) (i) *experiment 1* $[\text{HI}] = 0.04 \text{ (mol dm}^{-3}\text{)}$;



$$[\text{I}_2] = 0.01 \text{ (mol dm}^{-3}\text{)};$$

$$K_c = \frac{(0.01)^2}{(0.04)^2} = 6.25 \times 10^{-2};$$

ECF from above values.

experiment 2 $[\text{H}_2] = 0.02 \text{ (mol dm}^{-3}\text{)};$

$$[\text{I}_2] = 0.02 \text{ (mol dm}^{-3}\text{)};$$

$$K_c = \frac{(0.02)^2}{(0.04)^2} = 0.25;$$

6

ECF from above values.

(ii) experiment 2 (at higher temperature);

higher K_c value/equilibrium shifted to right;

2

[15]

10. (i) $\text{CO} = 0.4 \text{ (mol)};$

$\text{H}_2\text{O} = 1.6 \text{ (mol)};$

$$K_c (= 1.6^2 \div 0.4 \times 1.6) = 4.0/4;$$

3

Apply ECF from K_c expression.

Ignore units.

(ii) H_2 and CO_2 /products = 1.33/1.3 (mol);

CO and H_2O /reactants = 0.67/0.7 (mol);

2

Using $K_c = 9.0$, values for H_2 and CO_2 are 1.5 and values for CO and H_2O are 0.5.

[5]