

Test yourself

Chapter 8

- 1 Hydrogen and iodine are in equilibrium with hydrogen iodide, HI, at 700 K. The equilibrium expression for this mixture can be written in several different ways.

Which one of the following is **not** a correct equilibrium expression for this mixture?

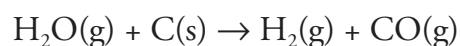
A
$$K_c = \frac{[\text{H}_2][\text{I}_2]}{[\text{HI}]^2}$$

B
$$K_p = \frac{p_{\text{HI}}^2}{p_{\text{H}_2} \times p_{\text{I}_2}}$$

C
$$K_c = \frac{[\text{HI}]^2}{[\text{H}_2][\text{I}_2]}$$

D
$$K_c = \frac{[\text{HI}]}{[\text{H}_2][\text{I}_2]}$$

- 2 What are the correct units for the equilibrium expression derived from the following equation?

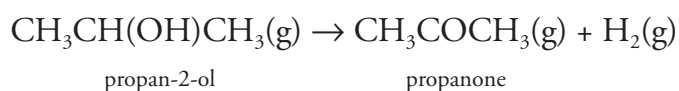


- A no units
B $\text{mol}^2 \text{dm}^{-6}$
C mol dm^{-3}
D $\text{dm}^3 \text{mol}^{-1}$

- 3** 50 cm^3 of oxygen and 200 cm^3 of carbon dioxide, each at a pressure of 200 kPa are mixed together without reacting.

What is the partial pressure of the oxygen when the total pressure of the mixture remains at 200 kPa ?

- A** 25 kPa
B 40 kPa
C 50 kPa
D 250 kPa
- 4** The equation below describes the equilibrium between propan-2-ol and propanone in the gas phase.



Which one of the following statements about this equilibrium is correct?

- A** Increasing the pressure decreases the yield of propan-2-ol
B Increasing the pressure decreases the yield of propanone
C Decreasing the pressure decreases the yield of hydrogen
D Decreasing the pressure has no effect on the reaction

- 5 The value of the equilibrium constant, K_c , for the reaction:



is $0.023 \text{ mol dm}^{-3}$ at 500 K and 35 mol dm^{-3} at 750 K.

Which one of the following statements about this reaction is correct?

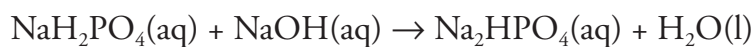
- A The reaction is endothermic
 - B Decreasing the temperature increases the equilibrium yield of PCl_3
 - C Increasing the temperature increases the partial pressure of PCl_5
 - D The reaction is exothermic
- 6 The Haber process for the synthesis of ammonia is described by the equation:



Which one of the following statements about the Haber process is **false**?

- A Increasing the temperature increases the yield of ammonia
- B The equilibrium can be shifted to the right by liquefying the ammonia
- C Decreasing the partial pressure of nitrogen shifts the reaction to the left
- D Increasing the total pressure has no effect on the value of K_p

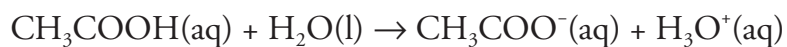
- 7 The reaction of aqueous sodium dihydrogenphosphate with sodium hydroxide is shown below.



Which one of the following species is conjugate with the OH^- ion in this equation?

- A** $\text{H}_2\text{PO}_4^-(\text{aq})$
- B** $\text{H}_2\text{O}(\text{l})$
- C** $\text{HPO}_4^{2-}(\text{aq})$
- D** $\text{Na}^+(\text{aq})$
- 8 In which one of the following reactions is the **bold** species acting as a Brønsted–Lowry acid?
- A** $\text{NH}_4^+ + \text{H}_2\text{O} \rightarrow \text{NH}_3 + \text{H}_3\text{O}^+$
- B** $\text{CN}^- + \text{H}_2\text{O} \rightarrow \text{HCN} + \text{OH}^-$
- C** $\text{HPO}_4^{2-} + \text{H}_3\text{O}^+ \rightarrow \text{H}_2\text{PO}_4^- + \text{H}_2\text{O}$
- D** $\text{HS}^- + \text{H}_2\text{O} \rightarrow \text{H}_2\text{S} + \text{OH}^-$
- 9 Which one of the following statements about strong and weak acids or bases is correct?
- A** A 1.00 mol dm^{-3} solution of ethanoic acid has a higher electrical conductivity than a 1.00 mol dm^{-3} solution of hydrochloric acid
- B** A 1.00 mol dm^{-3} of ammonia has a higher concentration of hydroxide ions than 1.00 mol dm^{-3} solution of sodium hydroxide
- C** A 1.00 mol dm^{-3} solution of sodium hydroxide has a higher pH than a 1.00 mol dm^{-3} solution of ammonia
- D** The pH of a 1.00 mol dm^{-3} solution of hydrochloric acid is higher than a 1.00 mol dm^{-3} solution of ethanoic acid

- 10** The equation below describes the ionisation of ethanoic acid.



Which one of the following statements about this reaction is correct?

- A** Adding OH^- ions to the reaction mixture shifts the equilibrium to the left
- B** The units of K_c for this reaction are mol dm^{-3}
- C** Diluting the reaction mixture with water lowers the pH of the solution
- D** Diluting the reaction mixture with water decreases the number of CH_3COOH molecules in solution