Chemguide - questions

 $\mathbf{K}_{\mathbf{C}}$

1. The reaction between ethene and steam to produce ethanol is an example of a homogeneous equilibrium:

$$CH_2=CH_2(g) + H_2O(g) = CH_3CH_2OH(g) \Delta H = -45 \text{ kJ mol}^{-1}$$

- a) What do you understand by the term *homogeneous* when it refers to an equilibrium reaction?
- b) Write the expression for the equilibrium constant $K_{\mathbb{C}}$ for the reaction above.
- c) Your expression should have included the use of square brackets. What meaning do these square brackets have?
- 2. The reaction between heated carbon and steam involves the heterogeneous equilibrium:

$$H_2O_{(g)} + C_{(3)} = H_{2(g)} + CO_{(g)}$$

- a) What do you understand by the term *heterogeneous* when it refers to an equilibrium reaction?
- b) Write the expression for the equilibrium constant $K_{\mathbb{C}}$ for this reaction.
- 3. Write expressions for the equilibrium constants for the following reactions.

a)
$$N_{2(g)} + 3H_{2(g)} = 2NH_{3(g)}$$

b)
$$CaCO_{3(s)} \longrightarrow CaO_{(s)} + CO_{2(g)}$$

c)
$$2SO_{2(g)} + O_{2(g)} = 2SO_{3(g)}$$

d)
$$CH_3COOCH_2CH_3(j) + H_2O(j) = CH_3COOH(j) + CH_3CH_2OH(j)$$

e)
$$Cu_{(3)} + 2Ag^{+}_{(aq)} = Cu^{2+}_{(aq)} + 2Ag_{(3)}$$

4. The equilibrium constant for a reaction involving only A, B, C and D is given by:

$$K_C = \frac{[C][D]}{[A][B]^2}$$

Write the equation for the reaction.