Homework #14-1: Equilibrium Constants (K_c and K_p)
Problems pg. 618-619 #14.8(a,b,c,e), 14.13, 14.16, 14.25, 14.28

14.8 Write equilibrium constant expressions for K_c, and for K_p, if applicable for the following processes:

(a) $2\ CO_2\ (g) \rightleftharpoons 2\ CO\ (g) + O_2\ (g)$

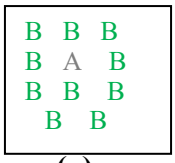
(b) $3\ O_2(g) \rightleftharpoons 2\ O_3\ (g)$

(c) $CO\ (g) + Cl_2\ (g) \rightleftharpoons COCl_2\ (g)$

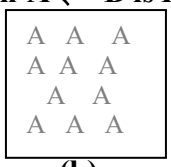
(e) $HCOOH\ (aq) \rightleftharpoons H^+\ (aq) + HCOO^-\ (aq)$

14.13 The equilibrium constant for the reaction A ⇌ B is $K_c = 10$ at a certain temperature. Thus,

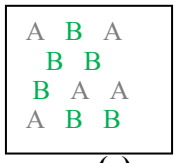
$$K_c = \frac{[B]}{[A]}$$



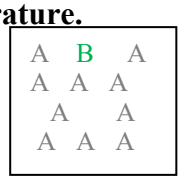
(a)



(b)



(c)



(d)

Case 1: If $K_C = 10$ and one starts with only reactant A, which diagram above best represents the system at equilibrium?

Case 2: With $K_C = 0.10$ which diagram best represents the system at equilibrium?

Explain why you can calculate K_C in each case without knowing the volume of the container.

14.16 Consider the following equilibrium process at 700°C

$$2\ H_2(g) + S_2(g) \rightleftharpoons 2\ H_2S\ (g)$$

Givens: 2.50 moles of H_2; 1.35×10^{-5} moles S_2; 8.70 moles H_2S all in 12.0 L flask
Calculate K_C.

14.25 Consider this reaction at 1600ºC $Br_2(g) \rightleftharpoons 2\ Br(g)$
Given: 1.05 moles of Br_2 are put into a 0.980 L flask. 1.20 % of the Br_2 undergoes dissociation. Calculate K_C. ***(Suggestion: Use an ICE table to get equilibrium values.)***

14.28 2 NOCl (g) $\rightleftharpoons$ 2 NO (g) + Cl_2 (g) Calculate K_C given:
A 2.50 mole quantity of NOCl was initially in a 1.50 L reaction chamber at 400ºC
After reaching equilibrium, it was found that 28.0 % of the NOCl had dissociated.
(Suggestion: Use an ICE table to find equilibrium values.)

Answers: 16) 1.08×10^{7}; 25) 6.23×10^{-4}; 28) 0.0353