16. A mixture of gases is allowed to reach equilibrium at 700°C in a 12.0L flask. At equilibrium, the mixture contains 0.208M SO_2, 1.12×10^{-6} M O_2 and 0.725 M SO_3.

$$2SO_2(g)+O_2(g) \rightleftharpoons 2SO_3(g)$$

What is equilibrium constant, Kc?

A. 9.22×10^{-8} C. 1.08×10^{7}

B. 3.11×10^{6} D. 4.56×10^{8}

17. Consider the following reaction

$$2NaHCO_3(s) \rightleftharpoons Na_2CO_3(s) + CO_2(g) + H_2O(g)$$
$$Kp = 0.23$$

A sample of $NaHCO_3$ is placed in an evacuated flask and is allowed to achieve equilibrium at 373K. What is the total gas pressure at equilibrium?

A. 0.12 atm C. 0.48 atm

B. 0.24 atm D. 0.96 atm

18. Some inert gas is added at constant volume to the following reaction at equilibrium.

$$NH_4HS(s) \rightleftharpoons NH_3(g) + H_2S(g)$$

Predict the effect of adding inert gas:

A. The equilibrium position shift in the forward direction

B. The equilibrium position shift in the backward direction

C. The equilibrium remains unaffected

D. The value of Kp is increased

19. In which reaction, low pressure and temperature favour the formation of products?

A. $2O_3(g) \rightleftharpoons 3O_2(g)$ $\Delta H = -284$ kJ

B. $2HI(g) \rightleftharpoons H_2(g) + I_2(g)$ $\Delta H = +10.5$ kJ

C. $2NH_3(g) \rightleftharpoons 2N_2(g) + 3H_2(g)$ $\Delta H = +92.4$ kJ

D. $2C_2H_2(g) + 5O_2(g) \rightleftharpoons 4CO_2(g) + 2H_2O(g)$ $\Delta H = -284$kJ

20. Consider this gas phase equilibrium system

$$PCl_5(g) \rightleftharpoons PCl_3(g)+Cl_2(g)$$
$$\Delta H^{o}_{rxn} = +87.8 kJ/mol$$

Which of the following statements is ***FALSE***?

A. Increasing the system volume shifts the equilibrium to the right.

B. Increasing the temperature shifts the equilibrium to the right.

C. A catalyst speeds up the approach to equilibrium and shifts the position of equilibrium to the right.

D. Increasing the temperature causes the equilibrium constant to increase

21. For the equilibrium system:

$$N_2O_4(g) + heat \rightleftharpoons 2NO_2(g)$$

Which of the following factors would cause the value of the equilibrium constant to decrease?

A. Decreasing the temperature.

B. Removing some NO_2.

C. Adding a catalyst.

D. Adding some He gas at constant volume.

22. For the reaction

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) + heat$$

What conditions of pressure and temperature would be optimum for the synthesis?

A. Low *T* and low *P*

B. Low *T* and high *P*

C. High *T* and low *P*

D. High *T* and high *P*

23. In a reversible chemical reaction having two reactants in equilibrium, if the concentration of the reactants doubled then the equilibrium constant will

LIVEWORKSHEETS