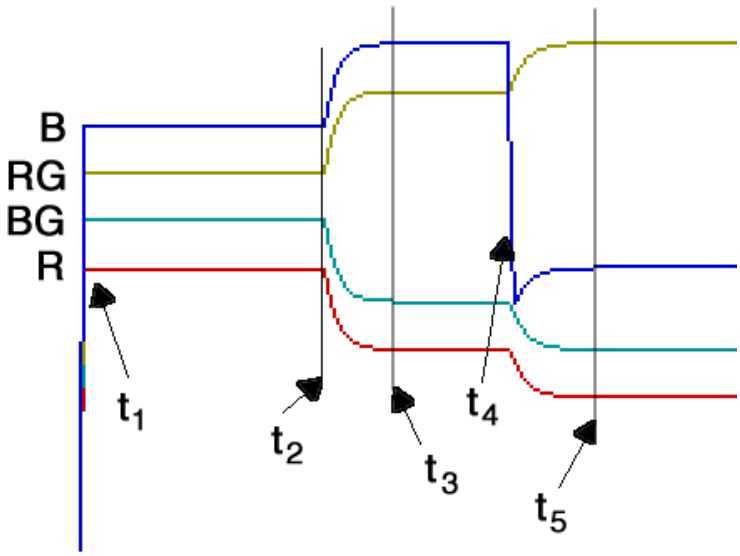
Equilibrium Questions:



1. Above is a chart recording depicting the reaction

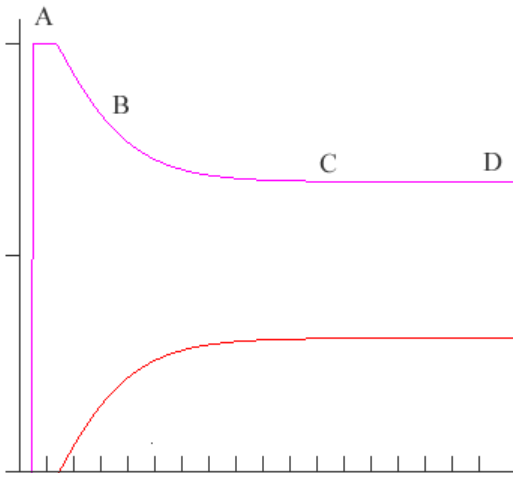
$$R + BG \rightleftharpoons RG + B$$

At t_1 some amounts of R, BG, RG and B have been added to the reaction vessel.
At t_2 the reaction as described in the chemical equation above occurs.

Based on the chart recording, which of the following statement is true?

A) The magnitude of the equilibrium constant for the reaction at the time from t_3 to t_4, and at the time after t_5, is the same;
B) The reaction is at equilibrium at the time from t_1 to t_2, at the time from t_3 to t_4, and at the time after t_5;
C) At t_2 the volume of the container was reduced.
D) The reaction is at equilibrium at the time between t_3 to t_4 only.

2. In the graph below the endothermic reaction $BR_{(g)} \rightleftharpoons B_{(g)} + R_{(g)}$ is represented. Initially only $BR_{(g)}$ is present in the reaction vessel. The marks along the *x*-axis are in 1 minute increments. The initial [BR] (*y-axis)* is 2.0 M. The reaction begins about 1.5 minutes in this case.

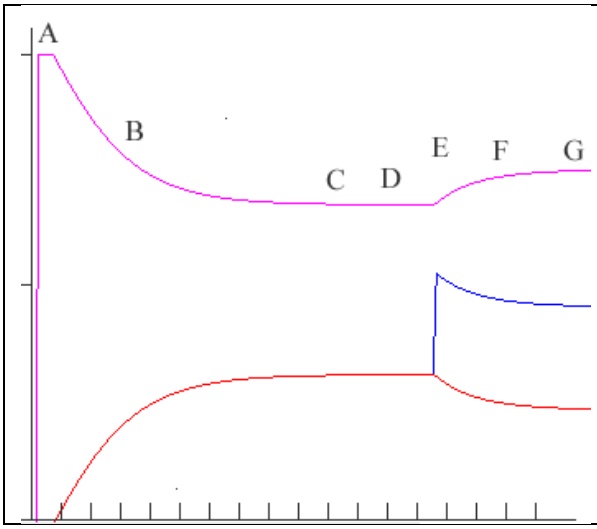


a) At what point (indicate a letter) does the reaction attain equilibrium? NOTE: You can also label the graph if your prefer.

b) Indicate whether K for the reaction is greater than 1, less than 1 or equal to 1. Explain.

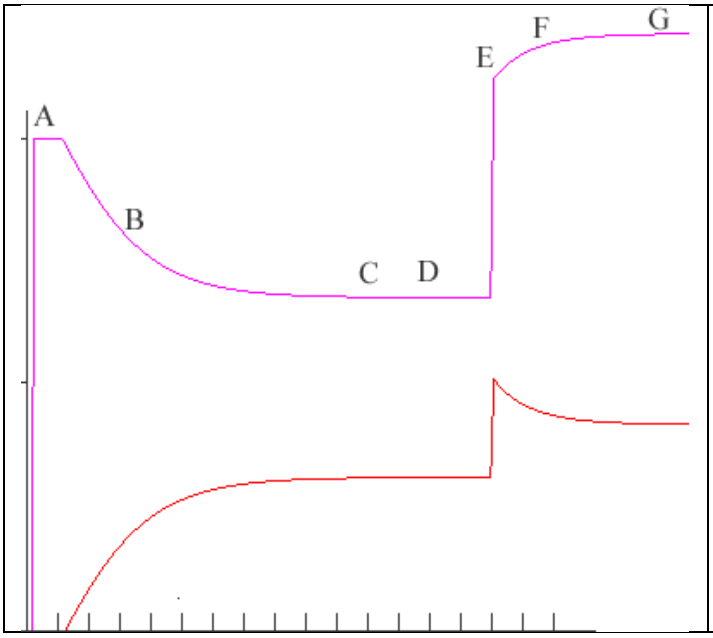
c) At point 'B' indicate how Q compares to K. Explain.

d) In this new view the same reaction has occurred. Indicate the stress (at point E) that was imposed on the system, and explain how the system changed as a response to the stress.



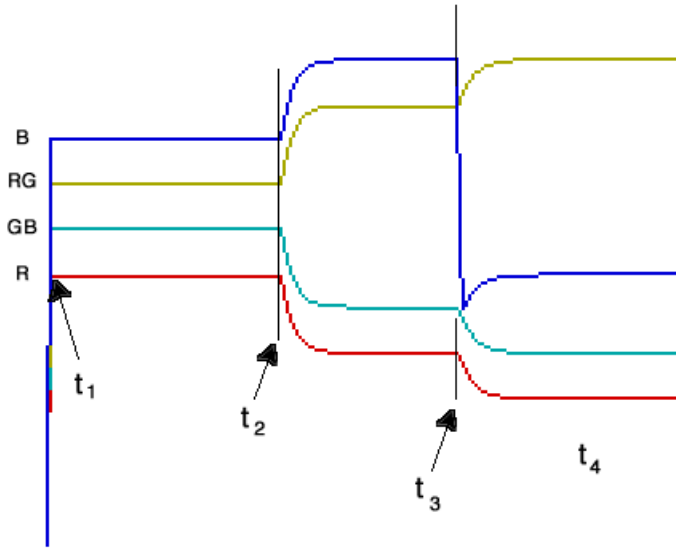
Explain:

e) In this new view the same reaction has occurred. Indicate the stress (at E) that was imposed on the system, and explain how the system changed as a response to the stress.



Explain:

Answer Questions 3 - 5 based on the chart recording below.



3. Above is a chart recording depicting the reaction

$$R + GB \rightleftharpoons RG + B$$

At t_1 some amounts of R, GB, RG and B have been added to the reaction vessel.
At t_2 the reaction as described in the chemical equation above occurs.

Based on the chart recording, which of the following statement is true?

A) The reaction is at equilibrium at some time from t_1 to t_2.
B) The reaction is at equilibrium at some time from t_2 to t_3
C) At t_2 some amounts of reactants were added and some amounts of products were removed from the container.
D) The volume of the container was decreased at t_2.

4. Based on the chart recording, which of the following statement is true?

A) At t_3 the volume of the container was increased.
B) At t_3 a catalyst was added to the container.
C) At t_3 the temperature of the reaction container was increased.
D) At t_3 some amount of B was removed from the container.

5. Based on the chart recording, which of the following statement is true?

A) During t_4 the reaction proceeds from left to right to establish equilibrium.
B) During t_4 the reaction is slowing down.
C) During t_4 the volume of the container is increased again.
D) During t_4 the reaction is proceeding from left to right to establish equilibrium but it will require more time before equilibrium is established.