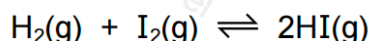


- 14 Gaseous hydrogen and gaseous iodine react to form gaseous hydrogen iodide.



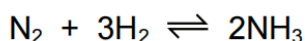
In an experiment, 2.0 mol of hydrogen and 2.0 mol of iodine are placed in a sealed container of volume 1.0 dm^3 .

The K_c value for this reaction under the conditions used is 9.0.

How many moles of hydrogen iodide are present at equilibrium?

- A** 0.57 mol **B** 1.2 mol **C** 1.5 mol **D** 2.4 mol

- 13 Nitrogen and hydrogen are mixed in a reaction vessel. The reaction reaches equilibrium giving a mixture of nitrogen, hydrogen and ammonia gases.



The mixture of gases present at equilibrium at a total pressure of 300 atm is shown.

gas	number of mol in mixture
nitrogen	180
hydrogen	590
ammonia	160

What is the equilibrium constant, K_p , for the forward reaction?

- A** $6.65 \times 10^{-6} \text{ atm}^{-2}$
B $7.13 \times 10^{-5} \text{ atm}^{-2}$
C 0.599 atm^{-2}
D $1.50 \times 10^5 \text{ atm}^2$

- 8 A dimer, Q, is stable when solid but a dynamic equilibrium is set up in solution.



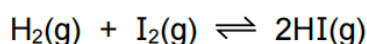
A solution of Q has an initial concentration of 0.50 mol dm^{-3} . When equilibrium has been reached, $[\text{Q(aq)}]$ has fallen to 0.25 mol dm^{-3} .

The changes in $[\text{Q(aq)}]$ and $[\text{R(aq)}]$ are plotted against time until equilibrium is reached. The value of K_c is then calculated.

Which graph and value for K_c are correct?

	graph	$K_c / \text{mol dm}^{-3}$
A	Graph A shows concentration / mol dm^{-3} on the y-axis (0 to 0.5) and time on the x-axis. Curve Q starts at 0.5 and decreases to 0.25. Curve R starts at 0 and increases to 0.25.	1
B	Graph B shows concentration / mol dm^{-3} on the y-axis (0 to 0.5) and time on the x-axis. Curve Q starts at 0.5 and decreases to 0.25. Curve R starts at 0 and increases to 0.25.	0.25
C	Graph C shows concentration / mol dm^{-3} on the y-axis (0 to 0.5) and time on the x-axis. Curve Q starts at 0.5 and decreases to 0.25. Curve R starts at 0 and increases to 0.5.	1
D	Graph D shows concentration / mol dm^{-3} on the y-axis (0 to 0.5) and time on the x-axis. Curve Q starts at 0.5 and decreases to 0.25. Curve R starts at 0 and increases to 0.5.	2

- 12 Hydrogen and iodine react to form hydrogen iodide in an exothermic reaction. The equation is shown.

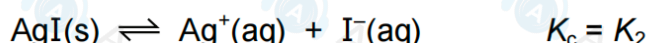
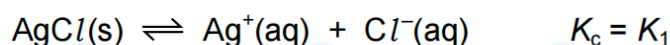


A 1 m^3 reaction vessel contains H_2 , I_2 and HI gases at equilibrium. The temperature is changed such that the total pressure in the 1 m^3 vessel doubles.

What is the effect on the value of K_p and on the position of equilibrium?

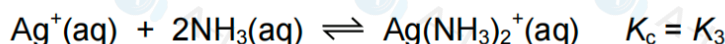
	effect on the value of K_p	effect on the position of equilibrium
A	decreases	moves left
B	increases	moves right
C	no change	moves left
D	no change	no change

- 16 Silver chloride and silver iodide form equilibria when added to water.



Each equilibrium position lies well to the **left**.

Silver iodide will not dissolve in aqueous ammonia. Silver chloride will dissolve in aqueous ammonia. Another equilibrium is formed.



The position of this equilibrium lies to the **right**.

What is the order of magnitude for these three equilibrium constants?

	smallest	→	largest
A	K_3	K_2	K_1
B	K_3	K_1	K_2
C	K_2	K_1	K_3
D	K_1	K_2	K_3

- 14 Hydrogen iodide is added to an evacuated reaction vessel. The vessel is sealed and warmed. A decomposition reaction occurs. Hydrogen and iodine are formed. Some hydrogen iodide remains.

When equilibrium is established, the total pressure is 1.20×10^5 Pa. The partial pressure of hydrogen is 4.00×10^3 Pa.

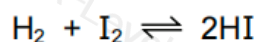
Hydrogen iodide, hydrogen and iodine are all gaseous under the conditions used.

What is the value of K_p for the equilibrium at this temperature, assuming the decomposition is the forward reaction?

- A 1.19×10^{-3} B 1.28×10^{-3} C 1.38×10^{-3} D 1.43×10^{-3}

- 10 3.60 moles of hydrogen gas and 2.00 moles of iodine vapour are placed in a reaction vessel which is then sealed and maintained at a constant temperature.

The equation for the reaction is shown.



At equilibrium, 3.20 moles of hydrogen remain. All reactants and products are gaseous.

What is the value of K_p under these conditions?

- A 0.0313 B 0.125 C 0.156 D 8.00