

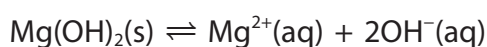
6 This question is about the solubility of metal hydroxides.

(a) Which of these metal hydroxides is the most soluble in water?

(1)

- A barium hydroxide
- B calcium hydroxide
- C magnesium hydroxide
- D potassium hydroxide

(b) When excess magnesium hydroxide is added to water and shaken, a saturated solution is formed and the mixture reaches equilibrium.



The equilibrium constant,  $K_c$ , for this reaction is

$$K_c = [\text{Mg}^{2+}(\text{aq})][\text{OH}^{-}(\text{aq})]^2$$

(i) Give a reason why the magnesium hydroxide is not included in the expression for  $K_c$ .

(1)

.....

.....

.....

.....

(ii) Give the units for  $K_c$ .

(1)



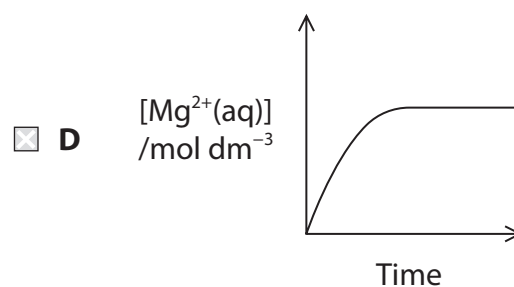
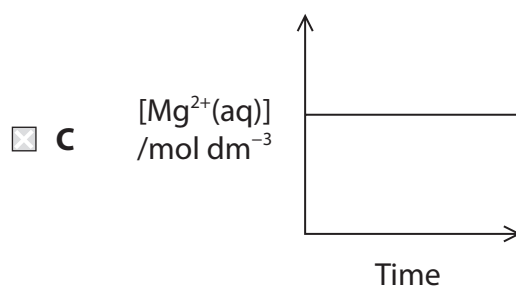
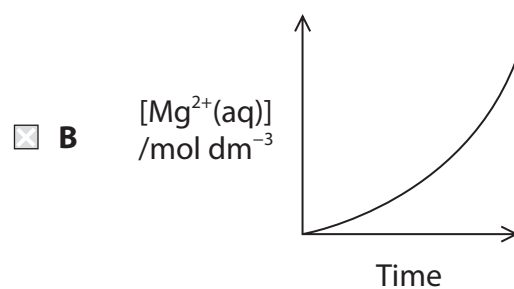
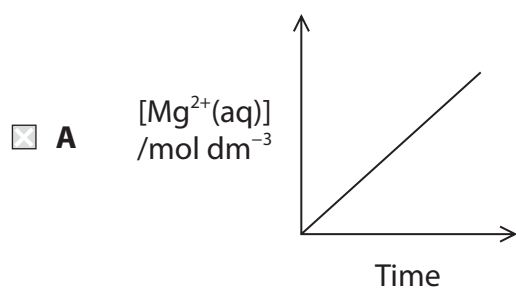
(iii) Calculate the enthalpy change of solution of magnesium hydroxide, using the following data.

Energy or enthalpy change	Value / $\text{kJ mol}^{-1}$
Lattice energy of $\text{Mg}(\text{OH})_2(\text{s})$	-2842
$\Delta_{\text{hyd}}H (\text{Mg}^{2+}(\text{aq}))$	-1920
$\Delta_{\text{hyd}}H (\text{OH}^{-}(\text{aq}))$	-460

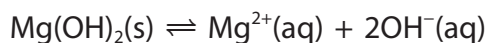
(2)

(iv) Which graph shows the change in the concentration of the  $\text{Mg}^{2+}(\text{aq})$  ions when some solid magnesium hydroxide is shaken with water and left to reach equilibrium?

(1)



- (v) Predict the effect, if any, of adding each of the following to a saturated solution of magnesium hydroxide in contact with solid magnesium hydroxide. Justify your answers in terms of the effect on the equilibrium.



(4)

Magnesium sulfate solution

.....

.....

.....

.....

.....

.....

.....

Dilute hydrochloric acid

.....

.....

.....

.....

.....

.....

.....

**(Total for Question 6 = 10 marks)**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

