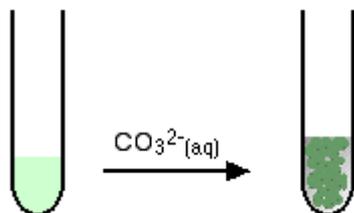


Chemguide – questions

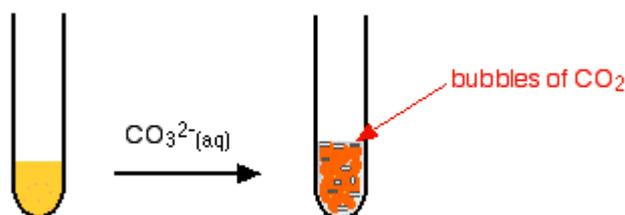
COMPLEX IONS: REACTIONS OF HEXAAQUA IONS WITH CARBONATE IONS

1. This question is about the reactions of two hexaaquairon ions with sodium carbonate solution.

hexaaquairon(II) ions:



hexaaquairon(III) ions:



Provided there is an excess of the hexaaquairon(III) ions compared with the carbonate ions, the iron(III) ion reaction gives off carbon dioxide. The iron(II) reaction never gives off carbon dioxide.

- a) Write the formulae for the precipitates formed in both cases. (You can use a simplified form for the iron(II) case.)
- b) Explain why the iron(III) case produces carbon dioxide whereas the iron(II) one doesn't.
- c) If you added a small amount of a solution containing hexaaquairon(III) ions to an excess of sodium carbonate solution, you would get the same precipitate formed, but no carbon dioxide. What is the carbon-containing species formed in this case?
2. For each of the following solutions say whether carbon dioxide would be formed as one of the products if you added sodium carbonate solution to them. In each case, write the formula for the precipitate formed during the reaction.
- a) aluminium chloride solution (containing $[\text{Al}(\text{H}_2\text{O})_6]^{3+}$)
- b) chromium(III) sulphate solution (containing $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$)
- b) cobalt(II) chloride solution (containing $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$)
- c) copper(II) sulphate solution (containing $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$)
- d) vanadium(III) chloride solution (containing $[\text{V}(\text{H}_2\text{O})_6]^{3+}$)