gridlocks – can you unlock the grid?

Chromium oxidation states

Before you answer the puzzles below fill in the table of chromium complexes using:

blue **+6** **green** **+2** **+3** **orange**

n.b. The true colour of $Cr(H_2O)_6^{3+}$ (violet or ruby) is seen mainly in the solid state, in aqueous solution some substitution normally occurs and aqueous chromium(II) ions appear green.

formula	colour of aqueous ion	oxidation state of Cr	notes
$Cr_2O_7^{2-}(aq)$		+6	oxidised form in acid
$CrO_4^{2-}(aq)$	yellow		oxidised form in alkali
$Cr^{3+}(aq)$			stable reduced form
$Cr(H_2O)_6^{2+}(aq)$			readily oxidised by air

Gridlock 1

Each row, column and 2 x 2 box contains information about the four different chromium ions. Use your problem solving skills and the answers in the table above to fill in the blank boxes.

formula		colour of aqueous ion	
$CrO_4^{2-}(aq)$			
		blue	
		$Cr_2O_7^{2-}(aq)$	
	green		

colour of aqueous ion	formula

gridlocks – can you unlock the grid?

Gridlock 2

Each row, column and 2 x 2 box contains information about each of the four chromium ions in the table.

formula		colour of aqueous ion	
	$Cr_2O_7^{2-}(aq)$		blue
			orange
+6			
+6			stable reduced form

oxidation number | notes

Gridlock 3

Each row, column and 2 x 2 box contains information about each of the four chromium ions in the table.

formula		colour of aqueous ion	
$CrO_4^{2-}(aq)$			orange
			readily oxidised by air
+3			

oxidation number | notes

gridlocks – can you unlock the grid?

Chromium oxidation states – answers

Before you answer the puzzles below fill in the table of chromium complexes using:

blue **+6** **green** **+2** **+3** **orange**

n.b. The true colour of $Cr(H_2O)_6^{3+}$ (violet or ruby) is seen mainly in the solid state, in aqueous solution some substitution normally occurs and aqueous chromium(II) ions appear green.

formula	colour of aqueous ion	oxidation state of Cr	notes
$Cr_2O_7^{2-}(aq)$	orange	+6	oxidised form in acid
$CrO_4^{2-}(aq)$	yellow	+6	oxidised form in alkali
$Cr^{3+}(aq)$	green	+3	stable reduced form
$Cr(H_2O)_6^{2+}(aq)$	blue	+2	readily oxidised by air

Puzzle 1 – answers

Each row, column and 2 x 2 box contains information about the four different chromium ions. Use your problem solving skills and the answers in the table above to fill in the blank boxes.

formula		colour of aqueous ion	
$CrO_4^{2-}(aq)$	$Cr(H_2O)_6^{2+}(aq)$	green	orange
$Cr^{3+}(aq)$	$Cr_2O_7^{2-}(aq)$	blue	yellow
blue	yellow	$Cr_2O_7^{2-}(aq)$	$Cr^{3+}(aq)$
orange	green	$CrO_4^{2-}(aq)$	$Cr(H_2O)_6^{2+}(aq)$
colour of aqueous ion		formula	

Puzzle 2 – answers

Each row, column and 2 x 2 box contains information about each of the four chromium ions in the table.

formula		colour of aqueous ion	
$Cr^{3+}(aq)$	$Cr_2O_7^{2-}(aq)$	yellow	blue
$Cr(H_2O)_6^{2+}(aq)$	$CrO_4^{2-}(aq)$	green	orange
+6	+3	readily oxidised by air	oxidised form in alkali
+6	+2	oxidised form in acid	stable reduced form
oxidation number		notes	

Puzzle 3 – answers

formula		colour of aqueous ion	
$CrO_4^{2-}(aq)$	$Cr^{3+}(aq)$	blue	orange
$Cr(H_2O)_6^{2+}(aq)$	$Cr_2O_7^{2-}(aq)$	yellow	green
+6	+6	stable reduced form	readily oxidised by air
+3	+2	oxidised form in acids	oxidised form in alkali
oxidation number		notes	