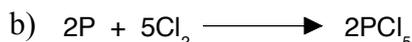
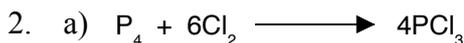


Chemguide – answers

GROUP 7: ASSORTED REACTIONS

1. The reactions become less vigorous. A mixture of fluorine and hydrogen explodes even in the cold and dark. A mixture of chlorine and hydrogen explodes if exposed to light or a flame. A mixture of bromine and hydrogen gives a mild explosion in the presence of a flame. Iodine and hydrogen react reversibly if heated continuously.



(Take care to get the formula for the particular type of phosphorus right.)

3. The sodium would burn with a bright orange flame in the red (or reddish brown) vapour to leave a white solid.

(You don't need to have remembered this particular reaction. You can work it out. You know that sodium burns with a bright orange flame. You know that bromine vapour is red (or reddish brown), and you know that sodium bromide is white. How do you know that sodium bromide is white? Because all sodium salts are white unless they also contain a transition metal - as, for example, in sodium dichromate.)

4. a) The grey iron wool burns in the pale green gas to form black crystals. (Actually, you usually get some red-brown solids formed as well if there is even a tiny trace of moisture in the apparatus.)



b) You get iron(II) iodide instead of iron(III) iodide, because the iodine isn't a strong enough oxidising agent to oxidise the iron any further. The reaction is much slower, and the product is grey

5. a) Pale green gas bubbled through a very pale green solution (almost colourless) produces a yellow or orange solution.

b) The iron(II) ions each lose an electron to form iron(III) ions – they are oxidised. The chlorine atoms in the molecule each gain an electron to form chloride ions – they are reduced.

(There are various ways you can say this, but you must include the facts that the iron(II) ions are oxidised by loss of electrons, and the chlorine is reduced by gaining them.)

c) Oxidising ability falls as you go down the group. A similar reaction does happen with bromine because bromine is still a strong enough oxidising agent to oxidise iron(II) ions. No reaction is possible with iodine because it isn't a strong enough oxidising agent.

Chemguide – answers

6. a) The oxidation states are:

in Cl ₂	0
in NaCl	-1
in NaClO	+1

The chlorine has therefore been both reduced and oxidised in the same reaction. This is known as disproportionation.

b) Sodium chloride, sodium chlorate(V) and water.



(If you couldn't do this, re-read the bottom of the Chemguide page, or if you want further help, look at the bottom of the page <http://www.chemguide.co.uk/inorganic/redox/oxidnstates.html> . This is one of the reactions where it is much easier to work out the equation using oxidation state changes than any other way.)