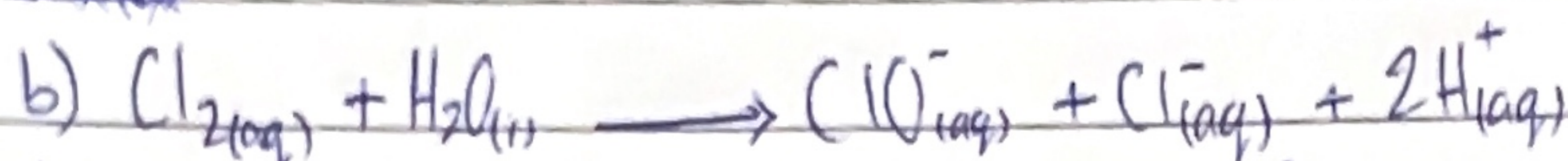


1) D      2) D      3) C      4) D      5) D      6) B

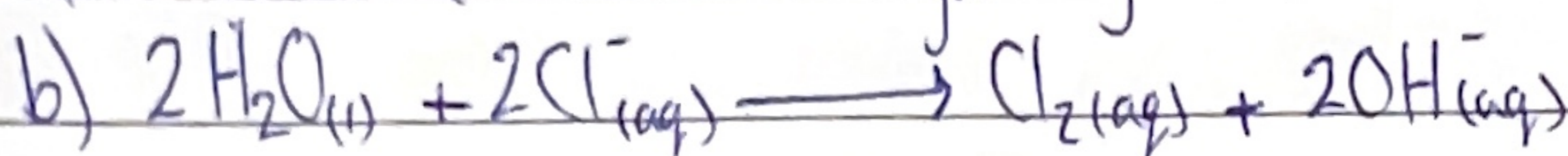
7) a) (i) +1      (ii) chlorate (I) ion



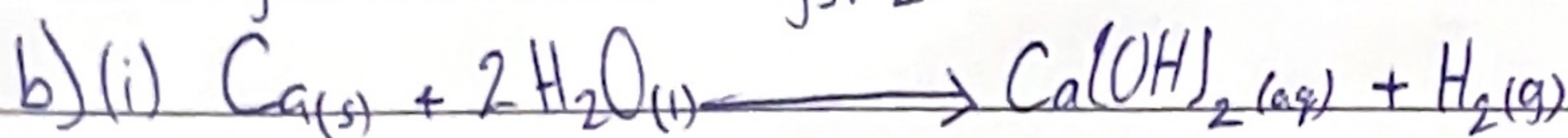
the oxidation number of  $\text{Cl}_2$  changes from 0 to +1 in  $\text{ClO}^-$  & -1 in  $\text{Cl}^-$ , it undergoes disproportionation because it's been both oxidised & reduced in the same reaction.

c) Oxidation number changes from +5 in  $\text{KClO}_3$  to +7 in  $\text{KClO}_4$  & -1 in  $\text{KCl}$ , chlorine has gone through disproportionation.

8) a) (i) oxidation is the loss of electrons while reduction is the gain of electrons  
(ii) Chlorine because it's gaining electrons.



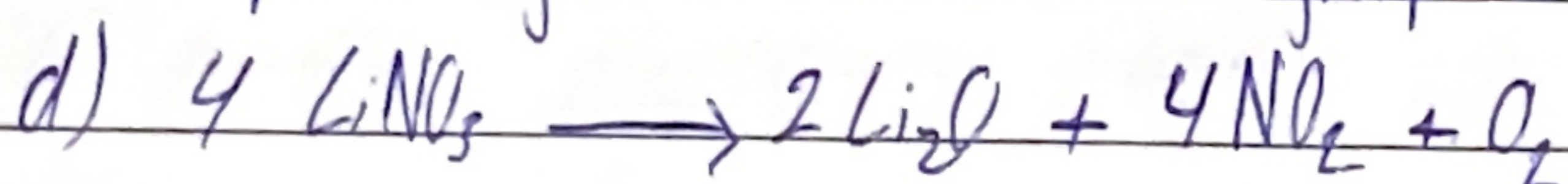
9) a) magnesium oxide:  $\text{MgO}$   
magnesium nitride:  $\text{Mg}_3\text{N}_2$

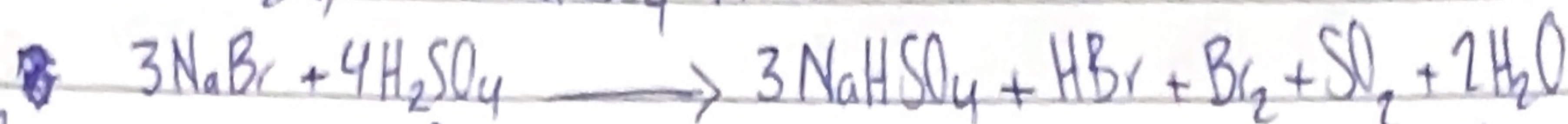
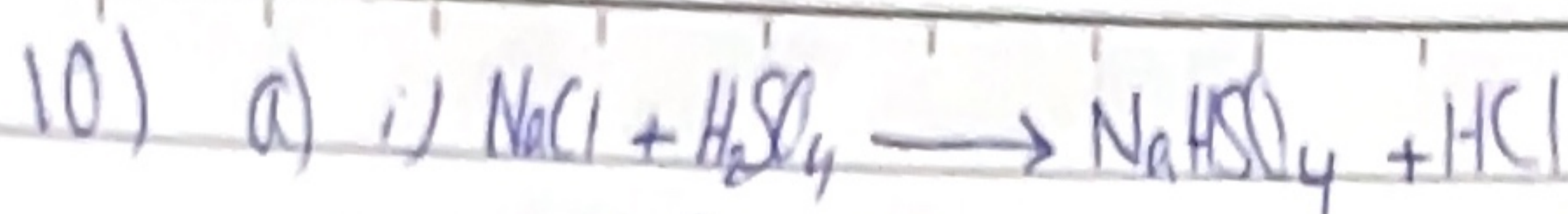


(ii) The reactivity increases down the group this is because of more shells and shielding electrons so low force of attraction hence it takes less energy to remove the outer electrons down the group.

(iii) it increases down the group.

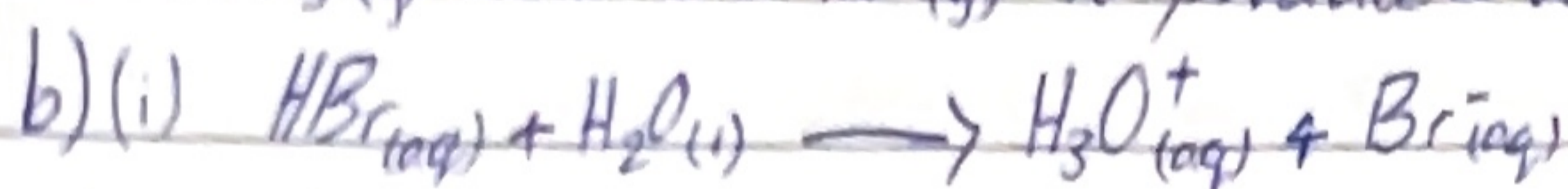
c) when the carbonates of group metals are heated they ~~produce~~ will decompose to produce metal oxide & carbon dioxide, the carbonate anion changes into more stable oxide ion which combines with the stable cation to form metal oxide, decomposition gets harder down the group as smaller cations affect the anions more.





(ii) HBr is a more powerful reducing agent than HCl so HCl cannot reduce  $\text{H}_2\text{SO}_4$  but HBr reduces it to  $\text{SO}_2$  & also HBr is oxidised to  $\text{Br}_2$

(iii)  $\text{NH}_3(\text{g})$  reacts with  $\text{HCl}(\text{g})$  to produce a white solid of ammonium chloride



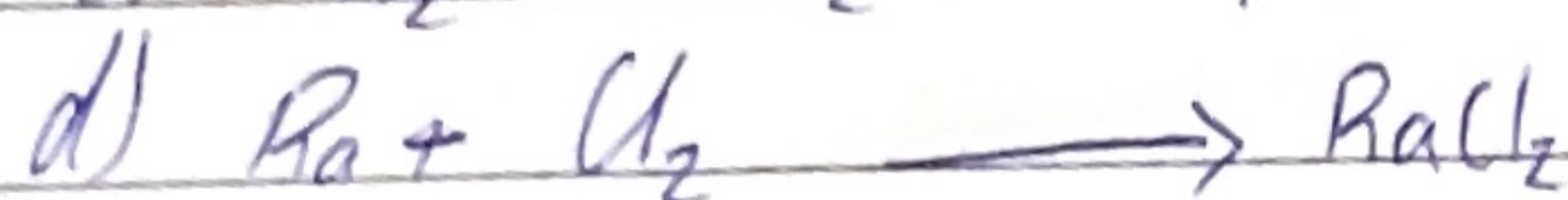
(ii) The solution turns pink, the solution is acidic because of the presence of  $\text{H}_3\text{O}^+$  ions.

c) Add dilute nitric acid followed by aqueous silver nitrate, Add an excess of dilute aqueous ammonia & filter then Add dilute nitric acid to the filtrate and a white ppt. appears this shows the presence of chloride ions in the original solution, Add concentrated aqueous ammonia to the residue, the solid does not dissolve showing the presence of iodide ions in the original solution

11) a) (i) Silver, shiny solid

(ii) Black solid, Astatine will be less reactive than iodine.

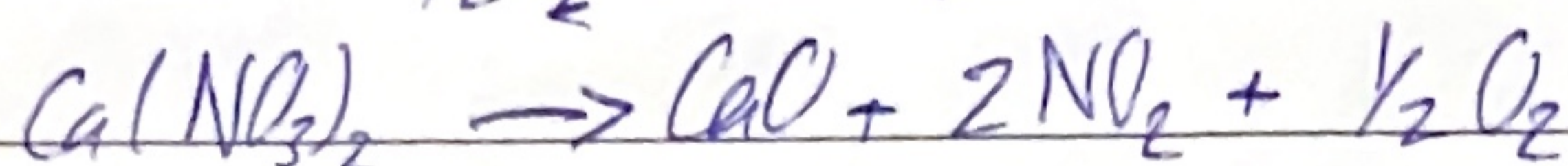
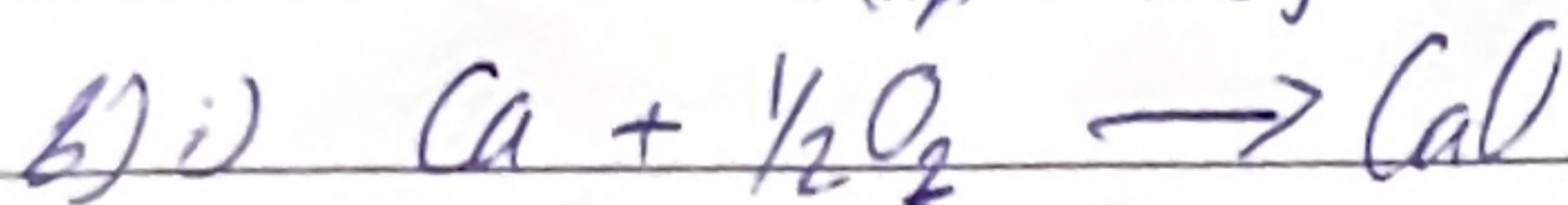
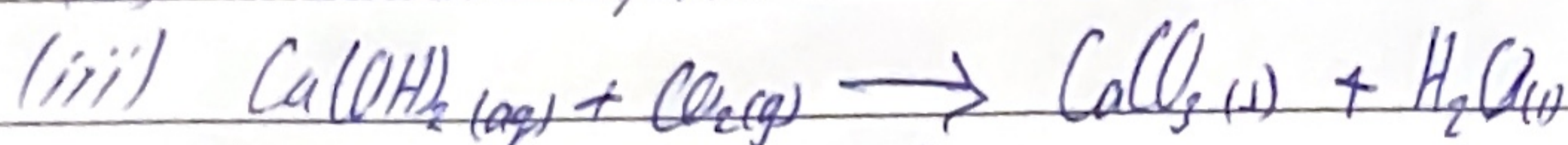
b) the reactivity of halogens decreases as you go down the group as the distance between the nucleus & bonding electrons increases.



e) D

12) a) (i) exothermic

(ii) limewater  $\text{pH} = 11$



(ii) As you go down the group the decomposition temp increases this is because the charge density of the cations decreases as the ions become larger, the polarising power of the cations decrease so there is less polarising of the nitrate ion.