# **QUALITATIVE ANALYSIS**

**PROBLEM 1407** *A* is a white compound, on heating gives yellow residue *B* and colourless gas that turns lime water milky. If *B* is heated in air for several hours at 500°C, it is converted into a scarlet powder *C*. *C* on heating with dilute aqueous nitric acid gives a colourless solution *D* and a brown solid *E*. If sodium

hydroxide is added to solution D, a white gelatinous precipitate is formed initially, which dissolves in excess of base. Compound E reacts with concentrated hydrochloric acid to give a white solid F and a green coloured gas. F is soluble in hot water but insoluble in cold, and forms a soluble complex with excess of chloride ion. With KI solution, D gives a bright yellow solid G which is insoluble in cold water, but in hot water a colourless solution, which on cooling gives a shimmering yellow plates like crystal. Identify A to G.

**PROBLEM 1408** A metal reacts with 50% nitric acid solution to give a blue coloured solution (A) and a brown gas (B). If the solution A is cautiously treated with dilute NaOH solution, a gelatinous blue precipitate (C) is formed, which if warmed, forms a black solid (D). Addition of concentrated ammonia solution to C, gives a deep blue solution that contains the ion (E) while addition of concentrated HCl solution to C gives a green solution of ion (F). If brown gas B is passed through water, a mixture of two monobasic acids are formed. Identify A to F and write reaction of B with water.

**PROBLEM 1409** A white powder turns yellow (B) on heating and evolves a gas which turns lime water milky, as well as water vapour. The yellow residue turns white on cooling, but will turns yellow again when heated. *B* reacts with dilute sulphuric acid to give a colourless solution (*C*). If dilute NaOH is added to C, a white precipitate (*D*) is formed initially, which dissolves on adding excess base. With dilute ammonia solution, *C* gives a white precipitate which dissolves in excess ammonia, giving a clear solution (*E*). Identify *A* to *E*.

**PROBLEM 1410** A metal (A) reacts moderately quickly with dilute sulphuric acid to give a pale green solution (B) and a colourless, neutral gas. If solution B is allowed to crystallize, a pale green solid is obtained which on strong heating gives a solid (C) and two acidic, non-metallic gases. A reacts with steam to give another solid (D) and the same gas as obtained in the first experiment with dilute sulphuric acid. A reacts with dry  $Cl_2(g)$  to produce a brown covalent solid (E), which sublime on heating. Aqueous solution of E reacts copper with metal, and for that reason are used to each printed circuit boards in electronics. Solution B gives a dirty green precipitate (F) if sodium hydroxide is added and remains insoluble in excess NaOH. If F is allowed to stand in air, it forms a foxy-red compound G, which can also be obtained by adding NaOH(aq) to aqueous solution of E. Identify A to G.

**PROBLEM 1411** A compound of sulphur (one atom per molecule), oxygen and one or more halogen atoms, was examined. A small amount of the substance reacted with water, it was completely hydrolyzed without any oxidation or reduction and all reaction products dissolved. 0.1 M solution of a series of test reagents were added to separate, small portions of a dilute solution of the substance.

- (i) Addition of  $HNO_3/AgNO_3$
- (ii) Addition of  $Ba(NO_3)_2$
- (iii) Adjustment to pH = 7 with  $NH_3$  and addition of  $Ca(NO_3)_2$
- (iv) Addition of  $KMnO_4$  followed by  $Ba(NO_3)_2$  to an acid solution of the substance.
- (v) Addition of  $Cu(NO_3)_2$ .

The above tests gave the following results:

- (i) A yellowish precipitate
- (ii) No precipitate
- (iii) No visible reaction

(iv) The main features were that purple colour disappeared and a white precipitate was formed on addition of  $Ba(NO_3)_2$ .

(v) No precipitate. Finally 7.2 g of the substance was dissolved in water and volume made to 250 mL. 25 mL of this solution on treatment with excess of  $AgNO_3$  gave 1.425 g precipitate.

Identify the original compound.

## Problems

**PROBLEM 1412** A white salt (A) evolves a colourless gas on treatment with dilute HCl solution, which turned moistened litmus paper red. A small sample of A was moistened with concentrated HCl and placed on a platinum wire and introduced into a bunsen burner flame, a green colouration was observed. On strong heating, A decomposes to produce a white solid B, which turned red litmus blue. 1.54 g of B was dissolved in 250 mL H<sub>2</sub>O and its 25 mL required 20.4 mL 0.0985 M HCl solution. Identify A and B.

**PROBLEM 1413** A metallic chloride *A*, when treated with NaOH/H<sub>2</sub>O<sub>2</sub>, gives yellow coloured solution due to formation of *B*. The colour of this solution changes to orange when dilute  $H_2SO_4$  is added. It is due to the formation of compound *C*. When a compound *D* is heated with *C* in presence of concentrated  $H_2SO_4$ , a red volatile liquid *E* is formed. *E*, when absorbed in NaOH solution, gives a yellow coloured solution of *B*, which when treated with (CH<sub>3</sub>COO)<sub>2</sub> Pb solution gives a yellow precipitate. Compound *C* when treated with NH<sub>4</sub>Cl, forms a compound *F*, which decomposes on heating, giving a colourless gas, water and a green residue *G*. Also *D* gives golden yellow flame colouration. Identify *A* to *G*.

**PROBLEM 1414** A white powder A on heating gives a colourless gas B and a solid residue C. The compound C turns yellow on heating and changes white on cooling. It dissolves in dilute acid and the resulting solution gives a white precipitate (X), with  $K_4[Fe(CN)_6]$  solution. Further A dissolves in dilute HCl with evolution of a gas B, which turns lime water milky. The solution thus obtained gives a white precipitate D with  $H_2S$  in slightly alkaline medium. Another portion of the solution gives initially a white precipitate E with NaOH, which dissolves on addition of excess base. Identify A to E.

**PROBLEM 1415** A white solid A on heating with excess of dilute HCl gave a pungent smelling gas B and a solution C. Solution C on treatment with aqueous ammonia did not give any precipitate, but on treatment with NaOH, precipitate D is obtained which dissolves in excess reagent. A on strong heating in air gave a pungent smelling gas E and a solid residue F. F dissolves completely in dilute HCl solution and the resulting solution produced a precipitate with BaCl<sub>2</sub>. Identify A to F.

**PROBLEM 1416** A white compound A on heating yields a basic oxide B. Compound A on treatment with dilute HCl evolves a gas which turns lime water milky. A is insoluble in water but dissolves in mineral acid. When HCl solution of A is made ammonical and a small amount of ammonium oxalate is added, a white precipitate C is obtained. Solid C decolourises acidic solution of KMnO<sub>4</sub>. Solution of C in dilute HCl evolves  $CO_2$  with  $MnO_2$  and the resulting solution gives a pink coloured precipitate with Na<sub>2</sub>S solution. Also A gives brick red colouration in bunsen burner flame. Identify A to C.

**PROBLEM 1417** A mixture of salt (A) is yellow coloured and it did not lose any weight on simple heating. A dissolved in cold, dilute nitric acid solution giving an orange coloured solution. This solution on treatment with aqueous NaOH gives a white coloured precipitate (B) which dissolves in excess of reagent leaving some white coloured residue (C). Filtrate of the above solution forms a brown precipitate (D) on treating with  $H_2O_2$ . Compound D reacts with concentrated HCl solution evolving a green coloured gas and a white solid E is formed which turned black on passing  $H_2S$  gas. Also C dissolves in dilute acid giving, a clear solution, to which if KI is added slowly, a black precipitate (F) is formed initially which dissolves in excess KI forming an orange solution. Identify A to F.

**PROBLEM 1418** A green salt mixture (A) consists of halides of two metal and both salts are soluble in water. A on dissolving in dilute HCl and passing  $H_2S$  gas yields a black precipitate (B). B was removed by filtration and filtrate was made alkaline by adding  $NH_3$  solution and finally treated with  $H_2O_2$  giving a yellow coloured solution of ion (C). On acidifying C with dilute  $H_2SO_4$  followed by treatment with few drops of amyl alcohol and finally with excess of  $H_2O_2$ , a blue colouration was observed due to formation of (D), which can be extracted into organic phase by gentle shaking. Compound C is insoluble

in boiling, dilute  $H_2SO_4$ , in NaOH as well as in aqueous Na<sub>2</sub>S, but dissolves in concentrated solution of nitric acid, leaving behind a white precipitate. If the above solution is boiled for a long time, white precipitate dissolved and a clear blue solution was formed. Sodium extract of the original salt mixture gave a white precipitate with dilute AgNO<sub>3</sub> solution, which dissolved in excess of aqueous ammonia solution. Identify *A* to *D*.

**PROBLEM 1419** A mixture consists of a two metal oxide A (green) and B (white). Mixture was dissolved in 20 mL 2 M NaOH solution containing some H<sub>2</sub>O<sub>2</sub> to give a clear yellow solution leaving no residue. The above solution was separated into two part. One part was acidified with acetic acid and then treated with (CH<sub>3</sub>COO)<sub>2</sub> Pb solution to give an yellow precipitate (*C*). *C* dissolve in dilute nitric acid forming a clear orange solution. Other part of the solution was acidified with 2 M HCl and the 2 M NH<sub>3</sub> was added till solution became alkaline and finally boiled. A white gelatinous precipitate (*D*) was obtained. *D* was then dissolved in dilute HCl and some 6 M ammonium acetate was added. The solution was finally treated with few drops of "aluminion" reagent and made basic by adding ammonium carbonate. A red precipitate was obtained. Identify A to D.

**PROBLEM 1420** A solid mixture consists of a red metal oxide (*A*) and a white hydrated salt *B*. The mixture was dissolved in dilute HNO<sub>3</sub> and a portion of this solution was treated with  $NH_3$  solution, just to make the solution neutral and then finally treated with  $NH_3/NH_4Cl$  buffer solution when a reddish brown gelatinous precipitate (*C*) was obtained. *C* was then dissolved in dilute HCl and few drops of  $NH_4SCN$  solution was added when a deep blood red colouration was observed. Filtrate obtained after removal of *C* was then treated with excess of  $(NH_4)_2S$  solution when a pink coloured precipitate (*D*) was formed. *D* was then dissolved in dilute HNO<sub>3</sub> and treated with NaBiO<sub>3</sub> solution. A deep purple coloured solution was formed.

In a separate experiment a pinch of the original salt mixture was mixed with solid  $K_2Cr_2O_7$  and then dissolved in concentrated  $H_2SO_4$  and finally boiled. A deep red fumes of (*E*) was obtained which made aqueous solution of NaOH yellow, when passed through it. Identify *A* to *E*.

**PROBLEM 1421** A solid substance is a mixture of a scarlet-red oxide (A) and a brown substance (B). The solid dissolve in boiling solution of dilute nitric acid giving a brown precipitate (C) and a clear orange solution. Solution is filtrated off and filtrate as well as precipitates were preserved for further analysis. Filtrate was further acidified by adding dilute HCl and H<sub>2</sub>S gas was passed. A black precipitate (D) was obtained. D was then filtered off and filtrate was treated with excess H<sub>2</sub>O<sub>2</sub> and finally boiled to decompose off any unreacted H<sub>2</sub>O<sub>2</sub>. The solution was finally cooled and treated with K<sub>4</sub>[Fe(CN)<sub>6</sub>] solution when a deep blue coloured precipitate (E) was formed. Compound (D) was dissolved in dilute HNO<sub>3</sub> and boiled, resulting in formation of a white precipitate. Brown solid C was analysed by dissolving in a concentrated HCl solution which resulted in formation of white precipitate (F) and a green coloured gas was evolved. Compound F was dissolved in boiling water and treated with aqueous sodium chromate solution, resulting in formation of a yellow precipitate. Identify A to F.

**PROBLEM 1422** A salt mixture consists of two salts, salt-A is scarlet coloured and insoluble in water, while salt-B is yellow coloured and soluble in water. The mixture was shaken with water in a test tube and filtrated off. The precipitate is pure A and filtrate is solution of B. A dissolves in concentrated solution of KI forming a colourless solution of C, which when treated with aqueous ammonia, forms a brown precipitate D.

A portion of original filtrate containing ions of salt B was treated with aqueous NaOH solution resulting in formation of a white gelatinous precipitate (E), soluble in excess reagent. E was dissolved in

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dilute HCl solution and few drops of this solution was placed on a filter paper, previously moistened with an alcoholic solution of alizarin. Filter paper, on drying at 100°C, gave a red lake.

In a separate experiment, 1 mL of the original filtrate was mixed with 1 mL starch solution and few crystals of  $KNO_2$  were added, a deep blue colouration was observed. Identify A to E.

**PROBLEM 1423** A mixture consists of a white oxide A and a white salt B in which latter is water soluble. Mixture was dissolved in water and filtered to separate precipitate A and filtrate containing B. A was dissolved in dilute hydrochloric acid solution and then treated with aqueous ammonia when a white gelatinous precipitate C was formed initially, which dissolved in excess reagent, forming a clear solution of D. A portion of original filtrate was treated with aqueous  $(NH_4)_2CO_3$  solution when a white precipitate E was formed. E gave a brick-red colouration in Bunsen burner flame. An other portion of original filtrate was treated sulphuric acid in a test tube and a freshly prepared ferrous sulphate solution was add through side wall of the test tube. A brown ring appeared at the junction of two solution. Identify A to E.

**PROBLEM 1424** A white mixture contain two salts *A* and *B*, both water soluble. *A* pinch of this salt mixture was dissolved in water and treated with excess of ammonium oxalate solution, resulting in formation of a white precipitate. Precipitate was added to a boiling solution of dilute acetic acid, where a portion of it went into solution, leaving behind a white solid *C*. Solution was cooled, filtered and filtrate was divided into two part. One part of the filtrate was treated with aqueous  $K_2CrO_4$  solution, giving a yellow precipitate (*D*), insoluble in dilute acetic acid. Other part of filtrate was treated with excess of  $(NH_4)_2CO_3$  solution giving a white precipitate (*E*). Solid compound *C* and *E* was subjected to flame test separately. *C* gave brick-red colouration while *E* gave apple-green colouration in the Bunsen burner flame.

In a separate analysis, an aqueous solution of original salt mixture was prepared and divided into two parts. One part of the solution was mixed with concentrated sulphuric acid solution and then a freshly prepared ferrous sulphate solution was added slowly, giving a brown ring at the junction. Other part of the solution was treated with aqueous  $AgNO_3$  solution when a white precipitate soluble in aqueous ammonia, was formed. Also salt *B* is hydrated one, and on heating lost 49.3% of its weight to become anhydrous. Identify *A* to *E*.

**PROBLEM 1425** A red coloured salt (A) is insoluble in water and dilute HCl but dissolved in dilute nitric acid, giving a clear orange solution. This solution when treated with a Na<sub>2</sub>CO<sub>3</sub> solution, gave a white precipitate (B), leaving behind a clear orange solution B on strong heating gives off a colourless acidic gas leaving behind a brown solid (C), soluble in aqueous ammonia as well as in dilute nitric acid. After removing precipitate B by filtration, filtrate was mixed with aqueous NaOH and turned into a clear yellow solution. Yellow solution on acidification with dilute sulphuric acid followed by treatment with excess of  $H_2O_2$  gave a blue colouration due to formation of a new compound D. D can be extracted into organic phase by shaking the solution with ether. Identify A to D.

**PROBLEM 1426** A white metal (A) burns in nitrogen to produce an ionic compound B. B on treatment with lime water forms a white precipitate (C), with evolution of a colourless gas (D). D when passed through an alkaline solution of  $K_2[HgI_4]$ , an yellow precipitate (E) was produced. Compound C was dissolved in dilute hydrochloric acid and some NH<sub>4</sub>Cl crystals were added to this solution. Resulting solution was treated with oxine (8-hydroxy quinoline), when a yellow precipitate of complex salt was produced. Identify A to E.

**PROBLEM 1427** A white hydrated salt (A) loses 45% of its weight on heating and rendered anhydrous. A on strong heating yields a dirty brown solid (B) with evolution of two gases (C) and (D). C turned

orange colour of dichromate solution into blue-green. *B* dissolved in boiling HCl solution to produce an yellow solution of (*E*). Solution *E* was separated into two parts and one part was treated with  $NH_4SCN$  solution giving a blood-red solution. To the other part of solution,  $H_2S$  was passed after making it alkaline, where a white turbidity was observed initially and the solution became light green on standing for some time. An aqueous solution of *A* gave white precipitate when treated with aqueous barium chloride solution. Identify *A* to *E*.

**PROBLEM 1428** A white salt (A) does not dissolve in water, but dissolve in dilute nitric acid solution. Passing  $H_2S$  gas through acidic solution of A, a black precipitate was produced which was insoluble in water, dilute  $HNO_3$  and alkali but dissolved in concentrated solution of  $Na_2S$  as well as in aqua-regia. Adding  $SnCl_2$ -dropwise to the solution of A, gave a white, silky precipitate (B), which turned into black precipitate (C) on adding excess reagent. Addition of KI to the acidified solution of A gave a red coloured precipitate (D) in the beginning, which dissolved in excess reagent. Also acidified solution of A, when treated with concentrated sulphuric acid followed by  $K_2Cr_2O_7$  and finally boiled, a dense brown fume was formed, which turned aqueous solution of NaOH, yellow coloured. Identify A to D.

**PROBLEM 1429** A black salt (A) is insoluble in dilute acid in cold but dissolve in boiling solution of concentrated hydrochloric acid, evolving a pungent smelling gas B. B turned a filter paper moistened with lead acetate, black. The above solution was cooled and separated into two parts. One part was treated with NaOH solution giving a white precipitate (C), insoluble in excess of reagent. C, when added to a concentrated  $H_2O_2$  solution, a clear, yellowish-brown solution of D was formed. Other part of the original solution was treated with KI solution, giving a black precipitate (E), which dissolved in excess of reagent forming a clear orange solution. Identify A to E.

**PROBLEM 1430** A white salt mixture contain two salts (anhydrous). *A* and *B*, both are water soluble. An aqueous solution of the salt mixture was prepared and treated with dilute NaOH when a white precipitate was obtained. Precipitate was shaken with concentrated NaOH solution and filtered again. The residue (*C*) containing metals of salt *B* and filtrate were analyzed independently. Passing H<sub>2</sub>S gas through filtrate yielded another white precipitate was formed. Also, a small portion of the original aqueous solution was mixed with some concentrated H<sub>2</sub>SO<sub>4</sub> solution and boiled. An irritating gas (*E*) was formed, which gave a white cloud on the surface of a glass road moistened with ammonia solution. Also, the original aqueous solution did not give test of nitrate and sulphate ion. Identify *A* to *E*.

**PROBLEM 1431** A solid mixture consists of a red oxide (*A*) and a water soluble, hydrated salt (*B*) which loses 51.2% of its weight on heating and becomes anhydrous. Solid mixture was dissolved in dilute HCl and the solution was used for further analysis. A portion of this solution was mixed with excess of  $(NH_4)_2S$ , when a black precipitate (*C*) was obtained. Solution was filtered off and filtrate was treated with aqueous NaOH when another white precipitate (*D*), insoluble in excess of reagent was produced. *D* was dissolved in small amount of dilute HCl and then excess of NaOH was added, followed by addition of a few drops of magneson-I [4-(4-nitrophenylazo) resorcinol], when a blue coloured precipitate formed. Solid *C*, when dissolved in dilute HCl, a white precipitate (*E*) was produced.

Another portions of the original aqueous solution was treated with  $K_4[Fe(CN)_6]$  and  $NH_4SCN$  separately, when deep blue, precipitate and deep blood-red colouration were observed respectively.

Soda-extract of the original mixture gave a white precipitate (F) with BaCl<sub>2</sub> solution. F when fused with Na<sub>2</sub>CO<sub>3</sub> on charcoal and the residue extracted with water and finally filtered into a freshly prepared solution of nitropruside {Na<sub>2</sub>[Fe(CN)<sub>5</sub>NO]}, transient purple colouration was observed. Identify A to F.

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**PROBLEM 1432** A salt mixture contain a black salt (A) and a white salt (B). Salt mixture dissolves in dilute sulphuric acid solution producing a clear blue solution. Passing  $H_2S$  gas through this solution gave black precipitate (C). The solution was filtered off and colourless filtrate was treated with aqueous ammonia giving a white precipitate (D), that was readily soluble in aqueous ammonium chloride solution.

Sodium extract of the salt mixture was prepared and divided into two part. One part of the extract was treated with BaCl<sub>2</sub> solution, giving a white precipitate (*E*), which dissolved into dilute HCl evolving a gas (*F*). *F* turned a filter paper, moistened with acidified  $K_2Cr_2O_7$  solution, green. Other part of extract was mixed with excess of MnO<sub>2</sub> and concentrated sulphuric acid solution and finally boiled. A brown coloured vapour was formed which gave orange-red staining when passed through starch paper. Identify *A* to *F*.

**PROBLEM 1433** A mixture consists of a black oxide (*A*) and a yellow salt (*B*). Mixture was shaken with dilute sulphuric acid solution resulting in formation of a yellow residue (*B*) and a clear solution on filtration. Filtrate was treated with excess of  $H_2O_2$  and finally boiled to decompose-off unreacted  $H_2O_2$ , cooled and divided into two parts. One part of the solution was treated with aqueous  $K_4[Fe(CN)_6]$  solution giving a blue precipitate (*C*), while other part of the solution gave a deep red colouration when treated with NH<sub>4</sub>SCN solution. Residue *B* was insoluble in excess ammonia but dissolved in KCN solution as well as in Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> solution.

Sodium extract of the original mixture was mixed with chlorine water when a brown colouration was observed. Brown solution when shaken with chloroform, organic phase turned violet. Identify A to C.

**PROBLEM 1434** A mixture contain a yellow salt (*A*) and a green salt (*B*). Heating salt mixture gives-off a colourless gas which turned lime water milky. The residue thus obtained was shaken with dilute hydrochloric acid which gave a white precipitate (*C*) and a clear blue solution. Solution was filtered off and  $H_2S$  gas was passed through filtrate when a black precipitate (*D*) was obtained. *D* was insoluble in boiling dilute  $H_2SO_4$  as well as in NaOH solution but dissolved in a concentrated aqueous potassium cyanide solution forming a clear and colourless solution of *E*. Also *C* dissolved in excess of ammonia as well as in sodium thiosulphate solution. Sodium extract of the residue, obtained after heating of original salt mixture, when mixed with concentrated  $H_2SO_4$  and some  $K_2Cr_2O_7$ , a deep brown fume was produced on boiling, that turned NaOH solution yellow. Identify *A* to *E*.

**PROBLEM 1435** A mixture consists of an yellow salt (*A*) and a white salt (*B*), both anhydrous. Salt mixture was dissolved in water and few drops of HCl was added to obtain a clear, yellow coloured solution. The solution was then treated with  $NH_3/NH_4Cl$  solution when a reddish-brown precipitate (*C*), insoluble in NaOH solution, was produced. Solution was filtered off and filtrate was treated with aqueous NaOH solution when a white precipitate (*D*), soluble in excess reagent, was formed. *D* was dissolved in dilute  $H_2SO_4$  solution and few drops of copper (II) sulphate was added to it. To the resulting solution, 2.0 mL of ammonium tetrathiocyanato mercurate (II)  $[(NH_4)_2[Hg(SCN)_4]]$  solution was added when a violet precipitate was formed. Also precipitate (*C*), dissolved in dilute HCl and became blood-red coloured when  $NH_4SCN$  solution was added. Sodium extract of the original salt mixture gave the following results:

(a) Extract solution in concentrated  $H_2SO_4$ , when mixed with  $K_2Cr_2O_7$ , gave a dense brown fumes on boiling, that turned aqueous NaOH solution yellow.

(b) Extract solution when treated with  $Hg(NO_3)_2$ , a yellow precipitate (*E*) was formed. Identify *A* to *E*.

**PROBLEM 1436** A white salt mixture contain two salts, salt *A* is water soluble and salt *B* is water insoluble. the salt mixture was leached with water so that soluble portion went into solution, leaving behind residue of *B*. Solution was filtered off and filtrate was preserved for further analysis. Precipitate *B* was insoluble in dilute HCl as well as in concentrated ammonium acetate solution but dissolved in boiling solution of concentrated sulphuric acid. The solution was cooled and treated with  $K_2CrO_4$  giving a yellow precipitate (*C*), that was insoluble in dilute acetic acid solution. Also the original filtrate gave a white gelatinous precipitate (*D*) on treatment with aqueous ammonia. *D* was dissolved in small volume of concentrated nitric acid and few drops of cobalt nitrate was added to the above solution. Now a filter paper was dipped into the solution and burned finally to give a blue fixed ash due to formation of (*E*). Sodium extract of the original salt mixture gave the following results:

(a) Boiling with concentrated sulphuric acid solution gave off a colourless, pungent smelling gas which formed a white cloud on the surface of a glass rod moistened with ammonia solution.

(b) Gave a white precipitate with lead acetate solution, that was insoluble in dilute acid but dissolved in concentrated solution of ammonium acetate. Identify A to E.

# **Solutions**

## **QUALITATIVE ANALYSIS**

**1407.** A : PbCO<sub>3</sub>, B : PbO, C : Pb<sub>3</sub>O<sub>4</sub>, D : Pb(NO<sub>3</sub>)<sub>2</sub>, E : PbO<sub>2</sub>, F : PbCl<sub>2</sub>, G : PbI<sub>2</sub> **1408.** A : Cu(NO<sub>3</sub>)<sub>2</sub>; B : NO<sub>2</sub>, C : Cu(OH)<sub>2</sub>, D : CuO, E :  $[Cu(NH_3)_4(H_2O)_2]^{2+}$ F :  $[CuCl_4]^{2-}$ .

B:  $2NO_2 + H_2O \longrightarrow HNO_3 + HNO_2$ 

**1409.** A :  $ZnCO_3 \cdot Zn(OH)_2$ , B : ZnO, C : ZnSO<sub>4</sub>, D : Zn(OH)<sub>2</sub>, E :  $[Zn(NH_3)_4]^{2+1}$ 

**1410.** A : Fe, B :  $FeSO_4$ , C :  $Fe_2O_3$ , D :  $Fe_3O_4$ , E :  $FeCl_3$ , F :  $Fe(OH)_2$ , G :  $Fe(OH)_3$ **1411.** SOFCI.

**1412.** A : BaCO<sub>3</sub>, B : BaO

- **1414.** A :  $ZnCO_3 \cdot Zn(OH)_2$  B : CO<sub>2</sub>, C : ZnO, X :  $K_2Zn_3[Fe(CN)_6]_2$ , D : ZnS, E :  $Zn(OH)_2$ .

 $\textbf{1416.} \ A: \ CaCO_3, \quad B: \ CaO, \quad C: \ CaC_2O_4.$ 

Solutions

**1417.** A :  $Bi_2O_3 + PbCrO_4$ , B :  $Bi(OH)_3 + Pb(OH)_2$ , C :  $Bi(OH)_3$ , D :  $PbO_2$ , E :  $PbCl_2$ , F :  $Bil_3$ **1418.** A : CuCl<sub>2</sub>, CrCl<sub>3</sub>, B : CuS, C :  $CrO_4^{2-}$ , D : CrO<sub>5</sub> **1419.** A :  $Cr_2O_3$ , B : Al<sub>2</sub>O<sub>3</sub>, C : PbCrO<sub>4</sub>, D : Al(OH)<sub>3</sub> **1420.** A : Fe<sub>2</sub>O<sub>3</sub>, B : MnCl<sub>2</sub> · 2H<sub>2</sub>O, C : Fe(OH)<sub>3</sub>, D : MnS, E : CrO<sub>2</sub>Cl<sub>2</sub>. **1421.** A :  $Pb_3O_4$ , B :  $Fe(CrO_4)_2$ , C :  $PbO_2$ , D : PbS, E :  $Fe_4[Fe(CN)_6]_3$ , F :  $PbCl_2$ . **1422.** A : HgI<sub>2</sub>, B : AlI<sub>3</sub>, C :  $K_2$ [HgI<sub>4</sub>], D : HgO · Hg(NH<sub>2</sub>)I, E : Al(OH)<sub>3</sub> **1423.** A : ZnO, B : Ca(NO<sub>3</sub>)<sub>2</sub>, C : Zn(OH)<sub>2</sub>, D :  $[Zn(NH_3)_4]^{2+}$ , E : CaCO<sub>3</sub>. **1424.** A : Ba(NO<sub>3</sub>)<sub>2</sub>, B : CaCl<sub>2</sub>  $\cdot$  6H<sub>2</sub>O, C : CaC<sub>2</sub>O<sub>4</sub>, D : BaCrO<sub>4</sub>, E : BaCO<sub>3</sub>. **1425.** A :  $Ag_2CrO_4$ , B :  $Ag_2CO_3$ , C :  $Ag_2O$ , D :  $CrO_5$ . **1426.** A : Mg, B : Mg<sub>3</sub>N<sub>2</sub>, C : Mg(OH)<sub>2</sub>, D : NH<sub>3</sub>, E : HgO  $\cdot$  Hg(NH<sub>2</sub>)I. **1427.** A :  $FeSO_4 \cdot 7H_2O_3$ , B :  $Fe_2O_3$ , C :  $SO_2$ , D :  $SO_3$ , E :  $FeCl_3$ . **1428.** A : HgCl<sub>2</sub>, B : Hg<sub>2</sub>Cl<sub>2</sub>, C : Hg, D : HgI<sub>2</sub> **1429.** A :  $Bi_2S_3$ , B :  $H_2S$ , C :  $Bi(OH)_3$ , D :  $BiO_3^-$ , E :  $BiI_3$ **1430.** A :  $ZnCl_2$ , B : MgCl\_2, C : Mg(OH)\_2, D : ZnS, E : HCl. **1431.** A : Fe<sub>2</sub>O<sub>3</sub>, B : MgSO<sub>4</sub> · 7H<sub>2</sub>O, C : FeS, D : Mg(OH)<sub>2</sub>, E : S, F : BaSO<sub>4</sub>. **1432.** A : CuBr<sub>2</sub>, B : ZnSO<sub>3</sub>, C : CuS, D : Zn(OH)<sub>2</sub>, E : BaSO<sub>3</sub>, F : SO<sub>2</sub> **1433.** A : Fe<sub>3</sub>O<sub>4</sub>, B : AgI, C : Fe<sub>4</sub>[Fe(CN)<sub>6</sub>]<sub>3</sub> **1434.** A : Ag<sub>2</sub>CO<sub>3</sub>, B : CuCl<sub>2</sub>, C : AgCl, D : CuS, E :  $[Cu(CN)_4]^{3-1}$ **1435.** A : FeCl<sub>3</sub>, B : ZnSO<sub>4</sub>, C : Fe(OH)<sub>3</sub>, D : Zn(OH)<sub>2</sub>, E : HgO · HgSO<sub>4</sub> **1436.** A : AlCl<sub>3</sub>, B : BaSO<sub>4</sub>, C : BaCrO<sub>4</sub>, D : Al(OH)<sub>3</sub>, E : CoOAl<sub>2</sub>O<sub>3</sub>.