Chapter 13 - Practical Work

Exercise 1

Solution 1.

(a) (i) Chemical test for ammonia:
If a rod dipped in concentrated hydrochloric acid is brought near ammonia gas, dense white fumes of ammonium chloride (NH_4Cl) are formed.

(ii) Chemical test for Sulphur dioxide:
It decolorizes pink coloured potassium permanganate solution.

$$2KMnO_4 + 2H_2O + 5SO_2 \rightarrow K_2SO_4 + 2MnSO_4 + 2H_2SO_4$$

(iii) Chemical test for HCl:
When HCl gas is passed through $AgNO_3$ solution, white precipitates of AgCl are formed which gets dissolved in excess of NH_4OH.

$$AgNO_3(aq) + HCl \rightarrow AgCl \downarrow + HNO_3$$

(iv) Chemical test for Chlorine:
It turns moist starch iodide paper (KI + starch solution) blue black.

(v) Chemical test for Carbon dioxide:
When this gas is passed through lime water, it turns milky due to the formation of white precipitates of $CaCO_3$ and on passing excess of carbon dioxide gas,
this milkiness disappears.

(vi) Chemical test for oxygen:
This gas is absorbed in colourless alkaline solution of pyrogallol and turns it dark brown.

(vii) Chemical test for hydrogen:
It burns with a pop sound when a burning taper is brought near it.

(b) Ammonia is a basic gas and its basic nature is suspected through litmus paper test because it changes the colour of red litmus paper to blue.
(c) Chlorine, carbon dioxide, hydrogen chloride, hydrogen sulphide and sulphur dioxide are acidic gases since they convert blue litmus to red.
(d) A is chlorine and B is Sulphur dioxide.
(e) Water vapour.

Solution 2.

(a) O_2
(b) NH_3
(c) Water vapour
(d) SO_2

Solution 3.

(a) Na_2CO_3 and K_2CO_3
(b) SO_2
(c) CO_2
(d) Cl_2
(e) H_2S

Solution 4.

Silver nitrate and ammonium nitrate.

Solution 5.

(a) Cl^-
(b) SO_4^{2-}
(c) CO_3^{2-}
(d) SO_3^{2-}

Solution 6.

(a) Since the salt solution turned blue litmus red hence the salt may be an acid.
(b) Since addition of barium chloride into the solution of salt gave white precipitate so the salt may contain SO_4^{2-}, SO_3^{2-}, CO_3^{2-} anion.
(c) The flame test of the salt gives persistent golden yellow colourisation which suggests presence of Na^+ ion.

Solution 7.

(a) Ca^{2+}
(b) Cu^+
(c) The three ways are:

1. Ammonia gas turns moist red litmus blue.

2. If a rod dipped in concentrated HCl is brought near the gas, dense white fumes of NH_4Cl are formed.
3. The gas turns colourless Nessler's reagent i.e. K_2HgI_4 brown.

Solution 8.

	Hydrogen sulphide	**Ammonia**	**Sulphur dioxide**	**Hydrogen chloride**
Shake the gas with red litmus solution	No change in the colour of litmus solution	Red litmus solution becomes blue in colour.	No change in the colour of litmus solution	No change in the colour of litmus solution
Shake the gas with blue litmus solution	Blue litmus solution becomes red in colour.	No change in the colour of blue litmus solution.	Blue litmus solution becomes red in colour.	Blue litmus solution becomes red in colour
Apply a burning splint to a gas	No reaction.	No reaction.	No reaction.	No reaction.

Solution 9.

(P) Ammonium chloride
(Q) Calcium
(R) Calcium hydroxide
(S) Lead (II) Nitrate
(T) Calcium Oxide
(U) Lead (II) Oxide
(V) Chlorine
(W) Hydrogen chloride

Solution 10.

Carbonate	Colour of residue on cooling
Zinc Carbonate	white
Lead Carbonate	yellow
Copper Carbonate	black

Solution 11.

(i) Sodium carbonate and sodium sulphite can be distinguished by using acidified $K_2Cr_2O_7$:
Take a small quantity of salt in a test tube; add dil. H_2SO_4.and warm if necessary. Now if on bringing a filter paper moistened with acidified $K_2Cr_2O_7$ near the gas evolved, the orange colour of the paper turns green then it is sodium sulphite.

(ii) Sodium thiosulphate and sodium sulphite:
The salts can be distinguished by using silver acetate. To the salt silver acetate and dil. HNO_3 are added. If there is formation of a white precipitate which slowly turns black

then it is thiosulphate anion since silver acetate forms $Ag_2S_2O_3$ which being unstable in acid solution gets converted to black Ag_2S.

(iii) Sodium hydroxide solution and ammonium hydroxide solution:
These salts can be distinguished by using a metal cation like calcium. When we add calcium salt to sodium hydroxide and ammonium hydroxide, then a white curdy ppt. is formed only in case of sodium hydroxide.

(iv) Ammonium sulphate and sodium sulphate:
These salts can be distinguished by using KOH. When KOH is added to ammonium sulphate, ammonia gas is evolved. Whereas there is no evolution of ammonia gas in case of sodium sulphate.

(v) Add barium chloride solution to sulphuric acid, nitric acid and hydrochloric acid. A white precipitate is formed in dilute sulphuric acid, and no such precipitate is formed in nitric acid and hydrochloric acid.
$BaCl_{2(aq)} + H_2SO_{4(aq)} \rightarrow BaSO_{4(s)} + 2HCl_{(aq)}$

Solution 12.

(a) Lead chloride as precipitate and sodium nitrite are formed.
(b)

	Zinc chloride	**Zinc nitrate**	**Zinc sulphate**
Barium chloride	No reaction	No reaction	White ppt. is obtained
Lead nitrate	No reaction	No reaction	No reaction

(c) Dilute sulphuric acid liberates carbon dioxide from metallic carbonates and bicarbonates. Carbon dioxide when bubbled into a test tube containing calcium hydroxide solution turns it milky.

Solution 1 (2004).

Aqueous salt solution	**Colour of the precipitate when NaOH is added in small quantity**	**Nature of the (soluble or insoluble) when NaOH is added in excess**
copper (II) sulphate	(i) Pale blue	(vi) Insoluble
zinc nitrate	(ii) White gelatinous	(viii) Soluble
lead nitrate	(iii) White chalky	(viii) Soluble
calcium chloride	(iv)White curdy	(ix) Insoluble
iron (III) sulphate	(v) Reddish brown	(x) Insoluble

Solution 1 (2005).

(I) Iron (II) Sulphate and Magnesium sulphate
(II) Iron (III) chloride and Zinc Chloride
(III) Lead nitrate
(IV) Copper nitrate.
(V) Lead nitrate.

Solution 1 (2006).

(a) When alkaline phenolphthalein solution is added to acids then the colourless solution remains colourless.
(b) Orange colour of methyl orange indicator turns pink when the indicator is added to acids.
(c) Neutral litmus solution turns red on addition to acids.

Solution 1 (2007).

Salt	**Anion**
A	Cl–
B	S2-
C	NO3–
D	SO32-
E	CO32-

Solution 1 (2008).

(a) Iron (II) sulphate
(b) (I) Ammonia (NH_3)
(II) Dilute nitric acid (HNO_3)
(III) H_2S
(IV) Chlorine (Cl_2)
(V) Ethanol