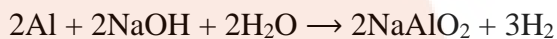


*Book Name: Selina Concise***EXERCISE- 1 (A)****Solution 1:**

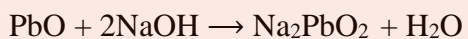
- (a) Ferrous salts : **Light green**
- (b) Ammonium salts : **Colourless**
- (c) Cupric salts : **Blue**
- (d) Calcium salts : **Colourless**
- (e) Aluminium salts : **Colourless**

**Solution 2:**

- (a)  $\text{Cu}(\text{OH})_2$
- (b)  $\text{ZnO}$
- (c)  $\text{NaOH}$
- (d)  $\text{NH}_4\text{OH}$
- (e)  $\text{Na}^+$ ,  $\text{Ca}^{2+}$
- (f)  $\text{Fe}^{2+}$ ,  $\text{Mn}^{2+}$
- (g) Aluminium
- (h)  $\text{Zn}(\text{OH})_2$  and  $\text{Al}(\text{OH})_3$
- (i)  $\text{PbO}$
- (j) Ammonium ion

**Solution 3:**

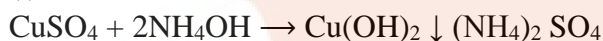
(Hot and conc.)      Sodium meta aluminate  
(colourless)



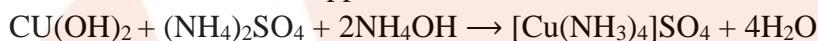
(Yellow)      sodium plumbate  
(colourless, soluble)

**Solution 4:**

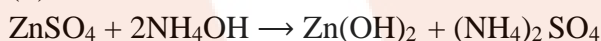
(i)



Blue                      pale blue ppt. colourless is solution

With excess of  $\text{NH}_4\text{OH}$ , ppt dissolvesExcess                      Tetrammine  
Copper(II) Sulphate

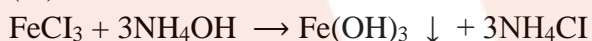
(ii)



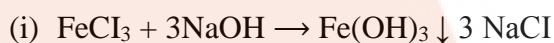
Colourless                      white, gelatinous ppt      colourless

With excess of  $\text{NH}_4\text{OH}$ , ppt dissolves(excess)                      Tetramminezinc(II) Sulphate  
(colourless)

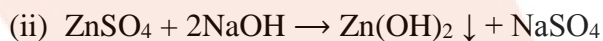
(iii)



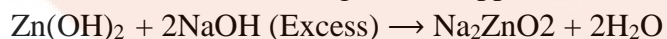
Yellow solution                      reddish brown ppt.      colourless in solution

**Solution 5:**

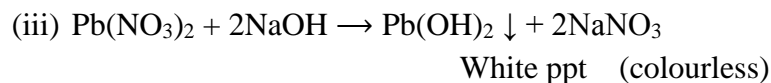
Yellow                      reddish brown, ppt      colourless in solution

In excess of alkali, the reddish brown ppt, of  $\text{Fe}(\text{OH})_3$  remains insoluble

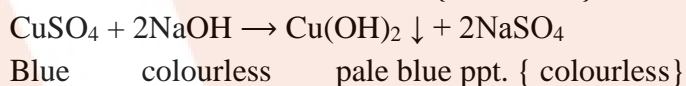
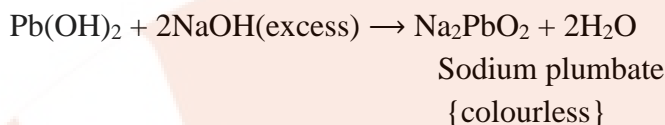
Colourless                      white gelatinous ppt. colourless

In excess of alkali, white gelatinous ppt. of  $\text{Zn}(\text{OH})_2$  becomes soluble

Sodium zincate (colourless)



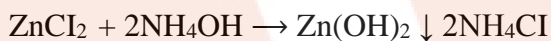
In excess of alkali, white precipitate of  $\text{Pb}(\text{OH})_2$  becomes soluble:



In excess of alkali, pale blue precipitate of  $\text{Cu}(\text{OH})_2$  is insoluble

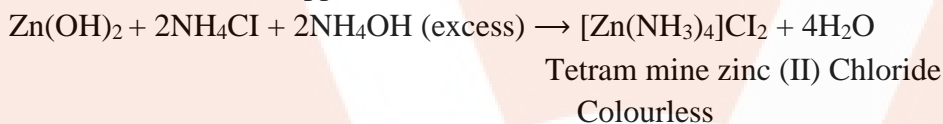
### Solution 6:

Zinc chloride ( $\text{ZnCl}_2$ ) is soluble in excess of ammonium hydroxide.



Colourless      White gelatinous ppt.

With excess of  $\text{NH}_4\text{OH}$  ppt dissolves



### Solution 7:

(a)  $\text{ZnCl}_2$

(b)  $\text{Zn}(\text{OH})_2$

### Solution 8:

(a)  $\text{PbO}$

(b)  $\text{ZnO}$

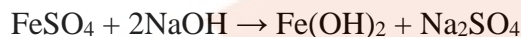
(c)  $\text{K}_2\text{ZnO}_2$

**Solution 9:**

(a) (iii)

Aqueous solution of copper sulphate is blue.

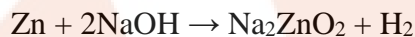
(b) (iii)



(Dirty green, (Colourless)

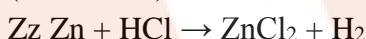
gelatinous ppt.)

(c) (iii)

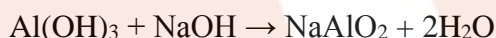


Sodium zincate

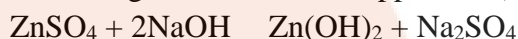
(Colourless)

**Solution 10:**

When freshly precipitated aluminum hydroxide reacts with caustic soda solution, white salt of sodium meta aluminate is obtained.



Sodium meta aluminate

**Solution 11:****(a) Distinguish by adding Sodium hydroxide solution:**On adding excess of NaOH, ppt. of  $\text{Ca(OH)}_2$  is sparingly soluble.On adding excess of NaOH, ppt of  $\text{Pb(OH)}_2$  is soluble.On adding excess of NaOH, ppt of  $\text{Pb(OH)}_2$  is soluble.

With excess of NaOH, white gelatinous ppt. of  $\text{Zn(OH)}_2$  is soluble. So, these two cannot be distinguished by NaOH alone. However white ppt. of  $\text{Pb(OH)}_2$  is readily soluble in acetic acid also.

With excess of NaOH, alkali pale blue ppt of  $\text{Cu(OH)}_2$  is insoluble.With excess of NaOH, dirty green ppt. of  $\text{Fe(OH)}_2$  is insoluble.With excess of NaOH, dirty green ppt of  $\text{Fe(OH)}_2$  is insoluble.With excess of NaOH, reddish brown ppt of  $\text{Fe(OH)}_3$  is insoluble.

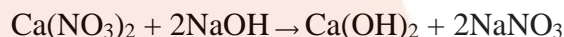
**(b) Distinguish by adding Ammonium hydroxide solution:**

- (i) On addition of  $\text{NH}_4\text{OH}$  to calcium salts no precipitation of  $\text{Ca}(\text{OH})_2$  occurs even with addition of excess of  $\text{NH}_4\text{OH}$  because the concentration of  $\text{OH}^-$  ions from ionization of  $\text{NH}_4\text{OH}$  is so low that it cannot precipitate the hydroxide of calcium.  
 $\text{Pb}(\text{NO}_3)_2 + 2 \text{NH}_4\text{OH} \rightarrow \text{Pb}(\text{OH})_2 + 2\text{NH}_4\text{NO}_3$   
On adding excess of  $\text{NH}_4\text{OH}$ , chalky white ppt. of  $\text{Pb}(\text{OH})_2$  is insoluble.
- (ii)  $\text{Pb}(\text{NO}_3)_2 + 2 \text{NH}_4\text{OH} \rightarrow \text{Pb}(\text{OH})_2 + 2\text{NH}_4\text{NO}_3$   
On adding excess of  $\text{NH}_4\text{OH}$ , chalky white ppt. of  $\text{Pb}(\text{OH})_2$  is insoluble.  
 $\text{ZnSO}_4 + 2\text{NH}_4\text{OH} \rightarrow \text{Zn}(\text{OH})_2 + (\text{NH}_4)_2\text{SO}_4$   
With excess of  $\text{NH}_4\text{OH}$ , white gelatinous ppt. of  $\text{Zn}(\text{OH})_2$  is soluble.
- (iii)  $\text{CuSO}_4 + 2\text{NH}_4\text{OH} \rightarrow \text{Cu}(\text{OH})_2 + (\text{NH}_4)_2\text{SO}_4$   
With excess of  $\text{NH}_4\text{OH}$ , pale blue ppt. of  $\text{Cu}(\text{OH})_2$  is soluble.  
 $\text{FeSO}_4 + 2\text{NH}_4\text{OH} \rightarrow \text{Fe}(\text{OH})_2 + (\text{NH}_4)_2\text{SO}_4$   
With excess of  $\text{NH}_4\text{OH}$ , dirty green ppt. of  $\text{Fe}(\text{OH})_2$  is insoluble.
- (iv)  $\text{FeSO}_4 + 2\text{NH}_4\text{OH} \rightarrow \text{Fe}(\text{OH})_2 + (\text{NH}_4)_2\text{SO}_4$   
With excess of  $\text{NH}_4\text{OH}$ , dirty green ppt. of  $\text{Fe}(\text{OH})_2$  is insoluble.  
 $\text{FeCl}_3 + 3\text{NH}_4\text{OH} \rightarrow \text{Fe}(\text{OH})_3 + 3\text{NH}_4\text{Cl}$   
With excess of  $\text{NH}_4\text{OH}$ , reddish brown ppt of  $\text{Fe}(\text{OH})_3$  is insoluble.

**Solution 12:**

Reagent bottles A and B can identified by using calcium salts such as  $\text{Ca}(\text{NO}_3)_2$ .

On adding  $\text{NaOH}$  to  $\text{Ca}(\text{NO}_3)_2$ ,  $\text{Ca}(\text{OH})_2$  is precipitated as white precipitate which is sparingly soluble in excess of  $\text{NaOH}$ .



Whereas, on addition of  $\text{NH}_4\text{OH}$  to calcium salts, no precipitation of  $\text{Ca}(\text{OH})_2$  occurs even with addition of excess of  $\text{NH}_4\text{OH}$  because the concentration of  $\text{OH}^-$  ions from the ionization of  $\text{NH}_4\text{OH}$  is so low that it cannot precipitate the hydroxide of calcium.

So the reagent bottle which gives white precipitate is  $\text{NaOH}$  and the other is  $\text{NH}_4\text{OH}$ .

**INTEXT QUESTIONS:****Solution 1:**

- (i) **Analysis:** The determination of chemical components in a given sample is called analysis.
- (ii) **Qualitative analysis:** The analysis which involves the identification of the unknown substances in a given sample is called qualitative analysis.
- (iii) **Reagent:** A reagent is a substance that reacts with another substance.
- (iv) **Precipitation:** It is the process of formation of an insoluble solid when solutions are mixed. The solid thus formed is called precipitate.

**Solution 2:**

- (i) Yellow
- (ii) Colourless
- (iii) Pale Green
- (iv) Colourless
- (v) Colourless

**Solution 3:**

- (i)  $\text{Fe}^{3+}$
- (ii)  $\text{Cu}^{2+}$
- (iii)  $\text{Cu}^{+2}$
- (iv)  $\text{Mn}^{2+}$

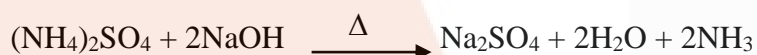
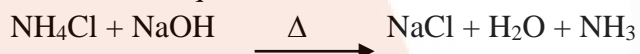
**Solution 4:**

- (i)  $\text{Ca}(\text{OH})_2$
- (ii)  $\text{Fe}(\text{OH})_2$  and  $\text{Cu}(\text{OH})_2$
- (iii)  $\text{Zn}(\text{OH})_2$  and  $\text{Pb}(\text{OH})_2$

**Solution 5:**

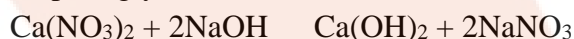
When ammonium salt is heated with caustic soda solution, ammonia gas is evolved.

The balance equation is:

**Solution 6:**

$\text{NH}_4\text{OH}$  and  $\text{NaOH}$  can be distinguished by using calcium salts.

For example on adding  $\text{NaOH}$  to  $\text{Ca}(\text{NO}_3)_2$ ,  $\text{Ca}(\text{OH})_2$  is obtained as white precipitate which is sparingly soluble in excess of  $\text{NaOH}$ .



On addition of  $\text{NH}_4\text{OH}$  to calcium salts, no precipitation of  $\text{Ca}(\text{OH})_2$  occurs even with the addition of excess of  $\text{NH}_4\text{OH}$ . This is because the concentration of  $\text{OH}^-$  ions from the ionization of  $\text{NH}_4\text{OH}$  is so low that it cannot precipitate the hydroxide of calcium.

**Solution 7:**

- (i)  $\text{Fe}(\text{OH})_2$  and  $\text{Pb}(\text{OH})_2$
- (ii)  $\text{Cu}(\text{OH})_2$  and  $\text{Zn}(\text{OH})_2$