CHEMISTRY VIVA QUESTIONS

1. ESTIMATION OF HARDNESS OF WATER BY EDTA METHOD

1. What is EDTA? Write the structure of EDTA.

Etyelene Diammine Tetra Acetic acid

2. What is EBT?

Erichrome black-T, used as an indicator in EDTA experiment.

3. What is pH? Write the formula for it. What is its range?

pH is to find out wether the solution is acid or basic (or) neutral.

pH = -log10[H+]

The pH range is o to 14.

4. Write the relationship between pH and pOH?

pH+pOH = 14

5. What is a buffer solution? Give examples.

Buffer solution is the one which maintains the pH of a solution constant.

Ammonia buffer = Ammonia chioride and liquid ammonia.

6. What the pH range is to be maintained around 10 in EDTA titration?

In order to get the end point, steel blue colour. It is the colour of the indicator EBT.

7. On what principle the colour changes from wine red to steel blue?

Hard water + EBT $\longrightarrow$ Metal ion –indicator complex(wine red colour)

Metal ion-indicator complex + EDTA $\longrightarrow$ Metal ion – EDTA complex + Indicator

8. What is the molecular and equivalent weight of CaCO3?

Molecular weight = 100 ; Equivalent weight =50

9. EDTA as such can be used for preparing the solution?Why?

EDTA is least soluble in water. Hence its disodium salt is used for preparing solution

10.Why ammonia buffer is used?

The pH is to be maintained between 9 – 10.

11. Define hardness. Name the types of hardness?

Hardness is the property of water which does not lather with soap. Types are carbonate hardness and non-carbonate hardness

12. Why $CaCO_3$ is used as a standard for calculating hardness?

Its molecular weight is 100 which is easier for calculation. It is most insoluable salt.

13. What is hard water and soft water?

Hard water is one which does not lather with soap. Soft water is the one which easily lathers with soap.

14. What is the formula to calculate Total, permanent and Temporary hardness?

Total hardness =- v2/v1 x 1000

Permanent hardness = v3/v1 x 1000

Temporary hardness = total hardness – permanent hardness

2. ESTIMATION OF COPPER IN BRASS BY EDTA METHOD

1. **What is an alloy?**

   Alloy is a mixture two or more metals. Eg., Stainless steel, Brass.

2. **What is brass?**

   Brass is an alloy of copper and zinc.

3. **What is the equivalent weight of copper?**

   Equivalent weight of copper = 63.55.

4. **How will you calculate the amount of copper in brass and its percentage?**

   Amount of copper in 1 litre = strength of copper X Equivalent weight of copper.

Percentage of copper = Amount of copper X 100 / Weight of brass

3. ESTIMATION OF DISSOLVED OXYGEN CONTENT WATER BY WINKLER'S METHOD

1. **What is Winkler's method?**
   If winkler's solution is used for titration, the method is called winkler's method. Winkler's solution is a mixture of alkali and iodide ions. Eg., sodium hydroxide and potassium iodide.

2. **What is purpose of adding $MnSO_4$?**
   $MnSO_4$ is added to converty the dissolved oxygen present in water into $MnO(OH)_2$.

3. **Why an yellowish brown colour developed when $MnSO_4$ added to water?**
   Due to the formation of $MnO(OH)_2$ from $MnSO_4$ an yellowish brown colour is formed.

4. **What is the end point? Explain why?**
   The end point is the colour change from orange to pale green. It is due to the following reaction:
   $$3Cr_2O_3- + 14H^+ + 6I^- \rightarrow 2Cr_3^+ + 7H_2O + 3I_2$$
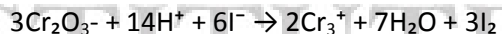
5. **What is the indicator used? Why?**
   Starch is the indicator. Because it forms blue coloured starch – iodide complex.

6. **Why starch is added at the end of the titration?**
   Because it forms iodide complex in the initial stage and no further liberation of iodine can takes place.

7. **What is the equivalent weight of oxygen?**
   Equivalent weight of oxygen is 8.

4. ESTIMATION OF CHLORIDE IN WATER SAMPLE (ARGENTOMETRIC METHOD)

1. **Why this method is specifically called as argentometric method?**
   Since silver (Argentine) is used it called as argentometric method.

2. **What are the different forms of cholorine in natural water?**

Chlorides present as NaCl, MgCl$_2$ and CaCl$_2$.

3. **How there is a colour change occurring from yellow to reddish brown?**
   Conversion of potassium chromate to silver chromate brings the colour change.

4. **Is the presence of chlorine harmful to human beings? How?**
   No, it is harmless. But it alters the taste of water.

5. **What is the equivalent weight of chloride ion?**
   Equivalent weight of chloride ion is 35.45.

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5. ESTIMATION OF ALKALINITY IN WATER SAMPLE

1. **What is alkalinity?**
   A measure of acid neutralizing ability of a substance.

2. **Which ions impart alkalinity to the natural water?**
   Carbonate, bicarbonate and hydroxide ions.

3. **How many types of alkalinity are possible?**
   1. Carbonate alkalinity
   2. Bicorbonate alkalinity and

3. Hydroxide alkalinity

4. **What is the colour of the indicators phenolphthalein and methyl orange in Acidic and basic medium?**

Indicator	Acidic medium	Basic medium
phenolphthalein	colourless	pink
Methyl orange	colourless	Golden yellow

5. **If the titre value is P = 0: which ions will cause alkalinity?**
Only bicarbonate alkalinity is present.

6. **If the titre value P = M: which ions will cause alkalinity?**
Only hydroxide alkalinity is present.

7. **If the titre value is P = ½ M: which ions will cause alkalinity?**
Only carbonate alkalinity is present.

8. **If the titre value is P < ½ M: which ions will cause alkalinity?**
Both bicarbonate and carbonate alkalinity are present.

9. **If the titre value is P > ½ M: which ions will cause alkalinity?**
Both hydroxide4 and carbonate alkalinity are present.

10. **To calculate the amount of alkalinity why equivalent weight of $CaCO_3$ is Included?**
In order to get the value in ppm it is multiplied with equivalent weight of $CaCO_3$.

11. **What is the relationship between ppm and mg/l?**
1ppm = 1 mg/l

12. **Why there is a colour change from pink to colourless?**
Phenolphthalein gives pink colouration with alkali water which on titration with acid becomes colourless.

13. **Why there is a colour change from golden yellow to permanent pale pink Change?**
Methyl change forms golden yellow colour with alkali water.
On addition of acid, colour changes to permanent pale pink colour.

6.CONDUCTOMETRIC TITRATION OF STRONG ACID Vs STRONG BASE

1. **What is an acid? Give examples.**

Acid is a substance which releases protons. Example : HCl, H$_2$SO$_4$

2. **What is a base? Give examples.**
   Base is a substance which releases OH- ions. Example : NaOH, KOH

3. **When strong acid combines with a strong base what type of reaction occurs?**
   Acid and a base cobines to form salt and water. The reaction is called as neutralization reaction.

4. **Name the apparatus used for this method?**
   Conductivity meter with a conducitivity cell.

5. **How conductance is related to the concentration of the ions?**
   The specific conductance is proportional to the concentration of ions in it.

6. **How the end point for a particular reaction is calculated using this, titration method?**
   On plotting a graph between conductance and volume of the base, the point of Intersection of the straight lines gives the end point.

7. **Why conductance decreases on addition of NaOH to HCl ?**
   During the titration the fast moving hydrogen ions are replaced by the slow moving Sodium ions, as a result the conductance of the solution decreases.

8. **What is the unit for conductance?**
   The unit for conductance is mho.

9. **What is the equivalent weight of HCl?**
   Equivalent weight of HCl is 36.5.

10. **What is the equivalent weight of NaOH?**
    Equivalent weight of NaOH is 40.

7.CONDUCTOMETRIC PRECIPITATION TITRATION OF BaCl$_2$ Vs Na$_2$SO$_4$.

1. **What is the equivalent weight of BaCl$_2$ and Na$_2$SO$_4$?**
   Equivalent weight of BaCl$_2$ is 137.
2. **Write the reaction between BaCl$_2$ and Na$_2$SO$_4$ and which compound is precipitated?**
   BaCl$_2$ + Na$_2$SO$_4$ BaSO$_4$ +2NaCl
   BaSO$_4$ is precipitated because it is a most sparingly soluble acid.

8.CONDUCTOMETRIC TITRATION OF MIXTURE OF ACIDS Vs. STRONG BASE

1. What is the equivalent weight of Hcl, CH₃COOH, and NaOH?

   Equivalent weight of HCL is 36.5

   Equivalent weight of NaOH is 40

   Equivalent weight of CH₃COOH is 60

2. From the volume of NaoH.How the amount of a substance present can be calculated?
   The plot between conductance and volume of NaOH is drawn. The point 0 intersection
   between the straight lines is the end poiont is the end point.From the volume obtained
   Amount = Normality x equivalent weight

9. DETERMINATION OF STRENGTH OF HCL BY NaOH - PH METRY

1.What is PH ? Write the formula for it ?

$PH = -\log_{10}[H^+]$

The PH range is 0 to 14

2.What is PH Scale ?

PH+POH = 14

3.What happens to the PH range when abase is added to an acid ?

When base is added to acid, the ph value increases.

4. How will you find out the end point from this titration method ?

A graph is plotted between $\triangle Ph/\triangle V$ Vs Volume of the base gives a peak value. That is the end point
for the titration

10.ESTIMATION OF FERROUS IRON BY POTETIOMETRIC METHOD

1. What is reference electrode ? Give examples.

The potential of unknown electrode can be measured by coupling it with another electrode called
reference electrode whose potential is already known or arbitrarity zero

Example: calomel electrode , standard hydrogen electrode.

2.What is calomel electrode ?

IT is a secondary reference electrode containing mercury, mercuruous chloride and a solution of Kcl

3.Write the E^0 Value for a calomel electrode

1) in 1N Kcl solution = 0.2800V

2) IN Saturated KCL Solution = 0.2422V

3) in 0.1 N KCL solution = 0.3338V

4. What type of reaction takes place when $FeSO_4$ reacts with $KMnO_4$ / $K_2Cr_2O_7$

Oxidation reaction takes place . During the titration Fe^{2+} is converted into Fe^{3+}

5.$KMnO_4$ and $K_2Cr_2O_7$ - What type of reagents are they ?

Oxidising agents for the Oxidation of Fe^{2+}

6.What is the equivalent weight of ferrous iron ?

Equivalent weight of ferrous iron is 55.85