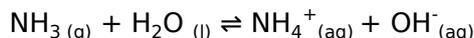


Acids, Bases and Salts Questions and Answers - Chemistry Form 4 Topical Revision

Questions

1. Study the reaction below and answer the questions that follow



- Define the term acid
 - Identify an acid in the above reaction
 - Explain your answers in (b) above
2. A student mixed equal volumes of Ethanol and butanoic acid. He added a few drops of concentrated Sulphuric (VI) acid and warmed the mixture
- Name and write the formula of the main products
Name.....
Formula.....
 - Which homologous series does the product named in (i) above belong?
3. A sample of water from a village in Trans Mara East District was divided into equal portions and each mixed with equal volume of soap solution. The observations made are tabulated below:

Sample of water	Treatment before adding soap	Observations made on shaking with soap
I	Boiled	Lather form immediately
II	No treatment	Slight lather form slowly
III	Treatment with washing soda	Lather formed immediately

- What type of hardness is present in water from the village. Explain
 - State one advantage of hard water
4. The solubility of Iron (II) Sulphate crystals at 22°C is 15.65g per 100g of water. Calculate the mass of iron(II) sulphate crystals in 45g of saturated solution at the same temperature
5. Hardness of water may be removed by either boiling or addition of chemicals:
- Write an equation to show how boiling removes hardness of water
 - Name two chemicals that are used to remove hardness of water
6. State one advantage of drinking hard water rather than soft water.
7. Given this reaction;
- $$\text{RNH}_2 + \text{H}_2\text{O} \rightleftharpoons \text{RNH}_3^+ + \text{OH}^-$$
- Identify the acid in the forward reaction. Explain
 - Dilute nitric acid can react with a solution of sodium carbonate. Write an ionic equation for the reaction
8. Magnesium hydrogen carbonate is responsible for the temporary hardness of water. This type of hardness can be removed by addition of ammonia solution
- Describe how temporarily hard water is formed
 - Write an equation to show the softening of temporarily hard water by the addition of aqueous ammonium solution
9. When 2M potassium hydroxide solution was added to solution R, a white precipitate T was formed which dissolved in excess potassium hydroxide solution to form solution L. solution R forms a white precipitate with sodium chloride solution:
- Identify the cation in solution R
 - Name precipitate T
 - Write the molecular formula of the compound in solution L

Answers

1.
 - a. Proton donor/electron acceptor/a substance which when dissolved in water dissociates/break to hydrogen ions as the only positive ion.
 - b. Water/ H₂O
 - c. It is a proton donor/electron acceptor
2.
 - i. Ethylbutanoate
 - ii. CH₃CH₂CH₂
 - iii. Esters
3.
 - a. Temporary water hardness . This is because hardness is removed by boiling
 - b. - Provide Ca²⁺ ions needed in formation of strong teeth and bones
- Hard water form a layer of carbonate of lead which prevent water coming in contact with lead which cause poisoning (award 1mk for any one)
4. Let x be the mass of FeSO₄ crystals in saturated solution
 ∴ Mass of water = 45 - x
 X g of FeSO₄ dissolves in (45 - x)g of water

$$\frac{100x}{45 - x} \text{ of FeSO}_4 \text{ dissolves in 100g of water}$$

$$\text{So, solubility is } \frac{100x}{45 - x} = 15.65$$

$$100x = 15.65(45 - x)$$

$$100x + 15.65x = 15.65 \times 45$$

$$115.65x = 15.65 \times 45$$

$$x = \frac{15.65 \times 45}{115.65}$$

$$= 6.0895$$
 So solubility = 6.09g of FeSO₄ in 100g of water
5.
 - a. $\text{Ca}(\text{HCO}_3)_2(\text{aq}) \xrightarrow{\text{heat}} \text{CaCO}_3(\text{s}) + \text{CO}_2 + \text{H}_2\text{O}(\text{l})$
 or:- $\text{Mg}(\text{HCO}_3)_2 \xrightarrow{\text{heat}} \text{MgCO}_3(\text{s}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{s})$ (award 1mk for any)
 - b. - Addition of Na₂CO₃(s)
- Addition of Ca(OH)₂(s)
- Addition of aqueous ammonia (award 1mk each for any two; Total =2mks)
6. - Provides essential minerals e.g. Ca²⁺ for strong bones and teeth ✓1
- It has a better taste
7.
 - a. The acid is water H₂O
Reason H₂O has donated a proton (H⁺)
 - b. $2\text{H}^+(\text{g}) + \text{CO}_3^{2-}(\text{aq}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
8.
 - a. - Magnesium carbonate reacts with rain water
- Containing carbon (iv) oxide dissolved.
- Forming magnesium hydrogencarbonate
 - b. Or $\text{MgCO}_3(\text{s}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{Mg}(\text{HCO}_3)_2(\text{aq})$
- 9.