

ACIDS, BASES AND SALTS

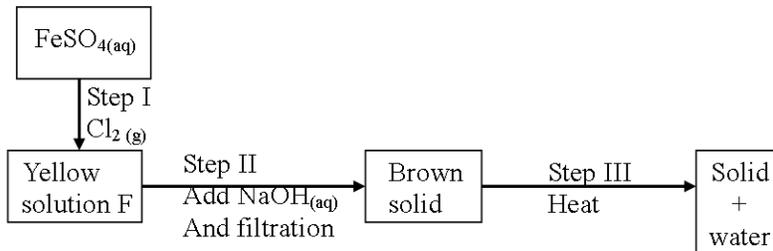
1. Aluminium chloride solution changes the blue litmus paper red. Explain this observation (2mks)

.....
.....
.....
.....

2. Explain why the enthalpy of neutralization of ethanoic acid with sodium hydroxide is different from that of hydrochloric acid with sodium hydroxide. [2m]

.....
.....
.....
.....

3. Study the scheme below and answer the questions that follow



- (a) Write the formula of the cation present in the yellow solution F (1mk)

- (b) What property of chlorine is shown in step I (1mk)

.....
.....

- (c) Write an equation for the reaction in step (III)

(1mk)

4. A solution contains 7.5g of solution in 20cm³ of water. When the solution is cooled crystals begin to appear at 10⁰C. Calculate the solubility of the solute at 10⁰C.

(2mks)

5. **Explain** why the PH of 1.0M Hydrochloric acid is 1.0 while that of 1.0 M ethanoic acid is 5.0.

(2marks)

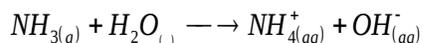
.....
.....

6. (a) A solution contains 7.5g of solute in 20cm³of water. When the solution is cooled crystals begin to appear at 10⁰C. **Calculate** the solubility of the solute at 10⁰C. (2marks)

(a) **What** causes permanent hardness of water?
(1mark)

.....
.....

7. Consider the equation:



(a) **Identify** the acid and base in the above equation using Bronsted - Lowry theory.
(3 marks)

Acid:

Base:

Reason:

.....

8. Three samples of water were treated with soap before boiling and after boiling.

Water sample	Amount of soap used in water
--------------	------------------------------

	Before boiling (cm ³)	After boiling(cm ³)
T	10.0	5.0
W	21.0	20.5
X	5.0	5.0

(a) **Which** sample of water is unlikely to contain dissolved salt? (1mark)

.....

(b) **Explain** the effect of boiling water in sample

(i) **T** (1mark)

.....

(ii) **X** (1mark)

.....

9. a) Write an ionic equation for the reaction between copper II ions in solution and excess ammonia solution. (1mk)

.....

b) Name the complex ion formed in the reaction in (a) above. (1mk)

.....

10. a) A solution of 100cm³ of 0.1M ethanoic acid has a different p.H value from that of 100cm³ of 0.1M hydrochloric acid. Explain the difference. (2mks)

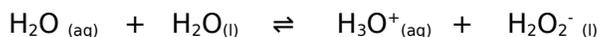
.....

a) Predict the p.H value of

(i) ethanoic acid. (½ mk)

(ii) hydrochloric acid (½ mk)

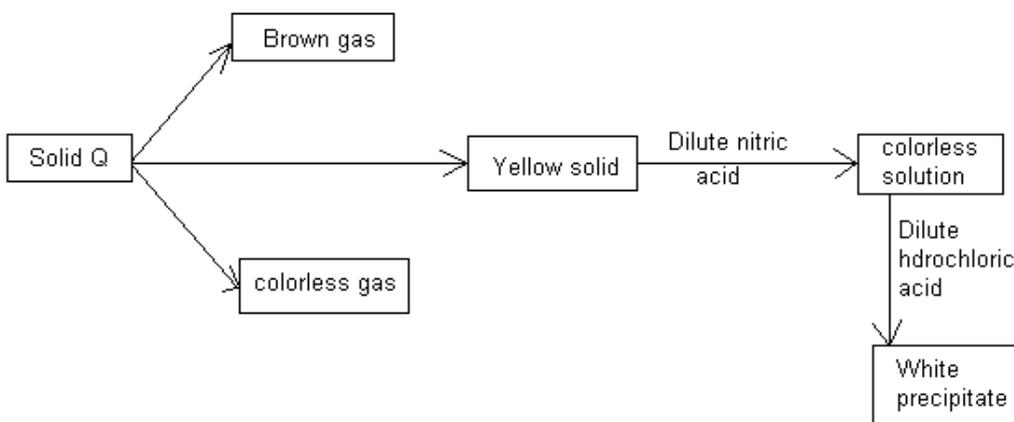
11. Name the species acting as the base in the equation below and explain your answer.



(1mk)

.....

12. Study the chart below and answer the questions that follow.



(a) Name:-

(i) Anion in solid Q

(1mk)

.....

(ii) Cation present in the colourless solution.

(1mk)

.....

(b) Write an equation for the reaction that occurred between the colourless solution and dilute hydrochloric acid to form the white precipitate.

(1mk)

.....

13. In an experiment three separate samples of water were tested using soap solution to find out the volume of soap needed to form a permanent lather with 1000cm³ of the water sample. Each sample was boiled and again the amount of soap required was determined. The following were obtained.

SAMPLE			
I	II	III	
Volume of soap required before boiling	27	3.0	10.6
Volume of soap required after boiling	27	3.0	3.0

(c) **Explain** the change in the volume of soap solution in sample III
(2mks)

.....
.....

(d) **Write down** the formula of the ions present in sample I
(1mk)

.....
.....

14. The solubility of potassium nitrate in water at 70°C is 155g/100g of water while at 20°C, the solubility is 31g/100g of water. A saturated solution of potassium nitrate in 50grammes of water at 70°C was cooled to 20°C. **Calculate** the mass of the salt deposited.

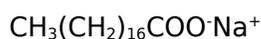
(2mks)

15. What is the difference between strong acid and concentrated acid? (2mks)

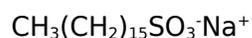
.....
.....
.....

16. a) Which of the following cleaning agent best in water containing magnesium sulphate?
(2mks)

Explain



.....
.....



.....
.....
b) Give one advantage of using hard water for domestic use. (1mk)

.....
.....
17. (a) What is the meaning of PH? (1mk)

.....
.....
(b) Define the following in terms of PH:
(i) An acid (1mk)

.....
.....
(ii) A base (1mk)

.....
.....
18. An aqueous solution of ammonia was added drop wise to a solution of copper (II) Sulphate until in excess.

(a) State the observation made when:-
(i) A few drops of aqueous ammonia were added. (1mk)

.....
.....
(ii) Excess aqueous ammonia was added. (1mk)

.....
.....
(b) Write the formula of the complex ion responsible for the observation made in a(ii) above (1mk)

.....
.....
19. (a) What is hard water? (1mk)

.....
.....
(b) Write the formulae of the two cations responsible for water hardness. (1mk)

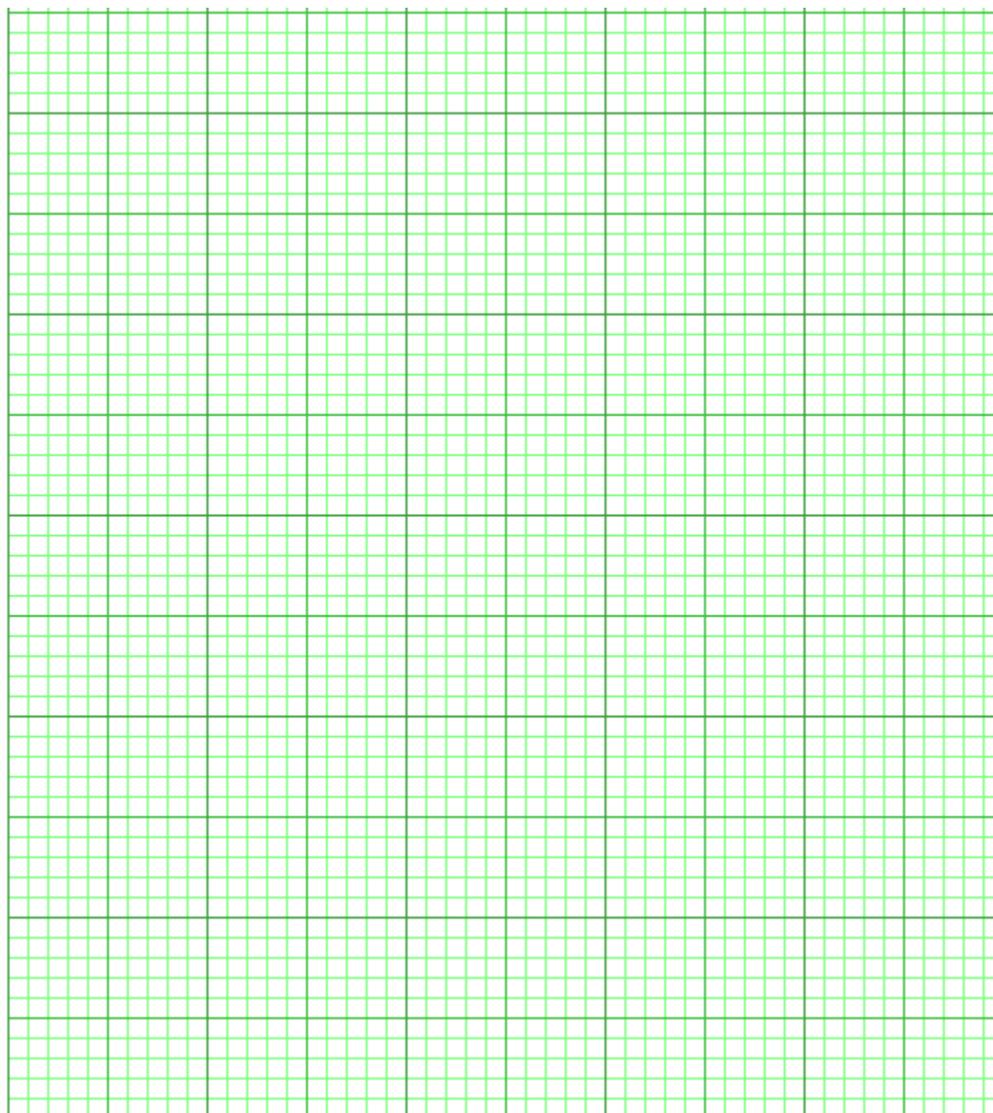
.....

 (c) Given that the formula of an ion exchange resin which softens water is Na₂X. Write any one ionic equation to show how the cations in (b) above are removed during water softening. (1mk)

20. In an experiment to investigate the solubility of solids P and Q, the following results were obtained.

Temperature (°C)	0	10	20	30	40	50
Solubility of solid P (g/ 100g of water)	8	13	24	38	61	98
Solubility of solid Q (g/ 100g of water)	28	32	35	38	42	46

a) Plot a graph of solubility of P and Q against temperature on the axis (5mks)



- b) From your graph determine
- i) The solubility of P at room temperature (25°C) (1mk)
 - ii) The temperature at which the solubility of P is 45g/100g (1mk)
- c) If a solution of P containing 35g of solid in 100g of water is cooled from 40°C, determine:
- i) The temperature at which crystals will first form (1mk)
 - ii) The mass of the crystals deposited if the solution is cooled to 5°C (1mk)

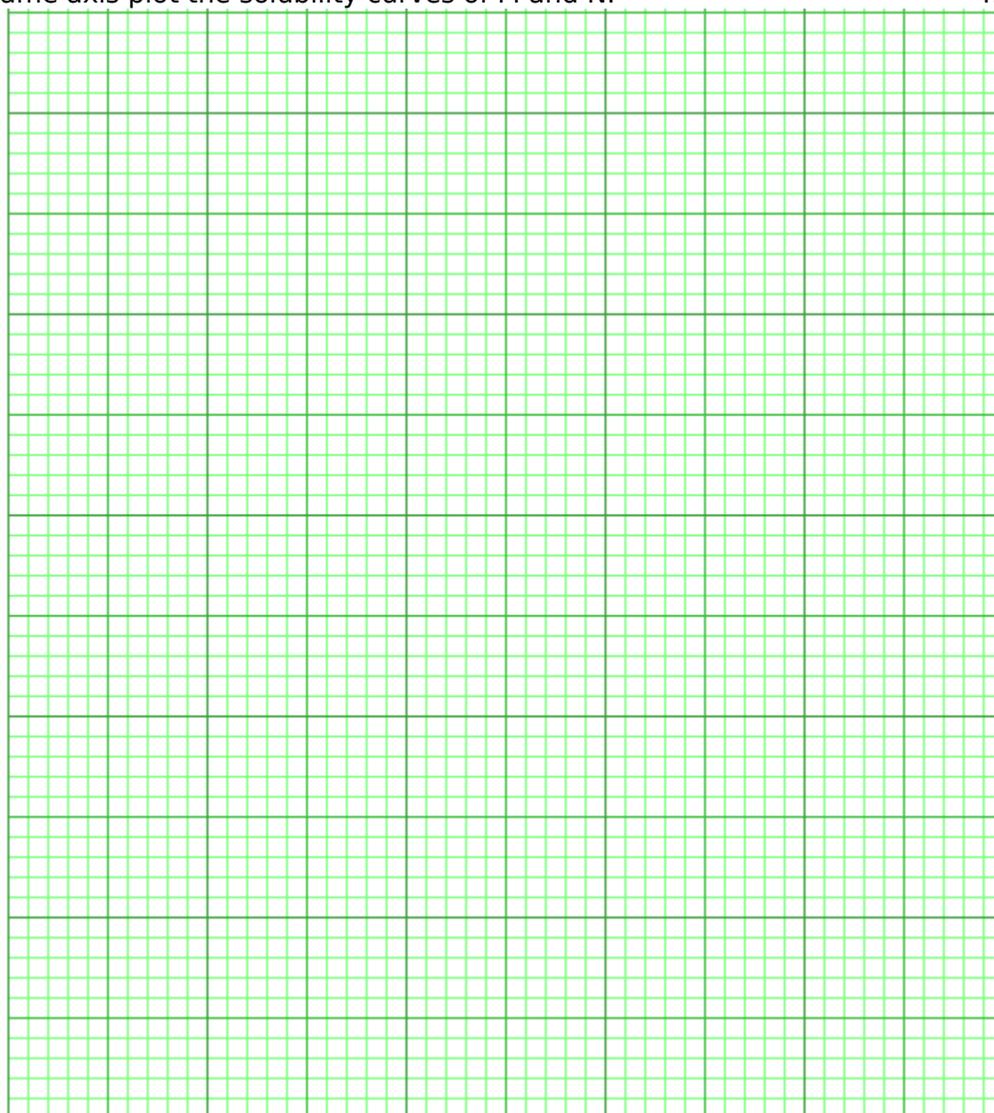
d) How much of substance Q could be soluble in 80g of water at 50°C (2mks)

e) State the temperature at which P and Q have the same solubility. (1mk)

21. In an experiment to determine the solubilities of two salts M and N at different temperatures, a student recorded his observation as shown below.

Temperature (°C)	0	10	20	30	40	50	60	70	80	90
Solubility of min g/100g of H ₂ O	14.3	17.4	20.7	25.0	28.5	33.3	40.0	47.0	55.0	64.0
Solubility of N in g/100g of H ₂ O	25.0	27.5	30.0	32.5	35.0	37.6	40.1	42.4	45.0	48.0

a) On the same axis plot the solubility curves of M and N. 4mks



b) Determine

(i) the solubility of M and N at 45°C

Solubility of M 1mk

Solubility N 1mk

ii) The temperature at which the two salts are equally soluble in water. 1mk

c) If 60g of M is dissolved in 100g of water and heated to 90°C, calculate the amount of salt that crystallized out if cooled to 20°C. 1mk

d) A mixture of 55g of salt M in 100g of water and 30g of solid N in 100g of water were cooled from 90° to 70°C. State and explain the observation. 3mks

e) State two applications of solubility.

2mks