. Simple classification of substances

1. *a) X – melting point √ ½*
   Z – Boiling point √ ½ *b)*
Its melting point is lowered and becomes less sharp due to the introduction of an impurity √1

2. *Luminous flame produces soot while non- luminous flame does not√1*
   Luminous flame is yellow in colour while non- luminous flame is blue in colour
   OR accept any correct answer

   b) The luminous flame is moderately hot and is clearly visible hence no danger is posed
3. *a) X*
   Gives the greatest number of spots hence the greatest number of pure substances √ 1
   b) The ink is made of more than one pure substance hence will also undergo chromatography
4. *(a) sublimation*
   (b) Bleaching action
   (c) Polymerization
5. *Adds excess dilute hydrochloric acid/ sulphuric (vi) acid*
   Filter to obtain copper metal
   Wash with distilled water
6. *To separate samples of CUO and charcoal in test tubes, dilute mineral acid is added with shaking CUO black dissolves to form blue solution√ ½*
   Charcoal does not dissolve in dilute mineral acids
7. *a) Is the process for the separation of a mixture of solutes by their different rates of movement over a porous medium caused by moving solvent*
   b) - Separation of dyes
   - To analyse and identify mixtures of substances which are difficult to separate by other means
   - Used to analyze dyes in food colouring (Any two each one mark)
8 *a) Element R – Sulphur*
   b) Mix solid P oxide with water
   put blue and litmus paper, Blue litmus paper remains blue, red litmus paper changes to blue.
   Put blue and red litmus papers in water
   Blue changes to red, red remain red.
9. *5 and 4 BOTH MUST BE CORRECT*
10. *EITHER*
   - *In separate test tubes, boil about 5cm^3 of each solution.*
   - *Sodium hydrogencarbonate solution remains colourless forms no precipitate*
   - *Calcium hydrogencarbonate solution changes from colourless to white precipitate*

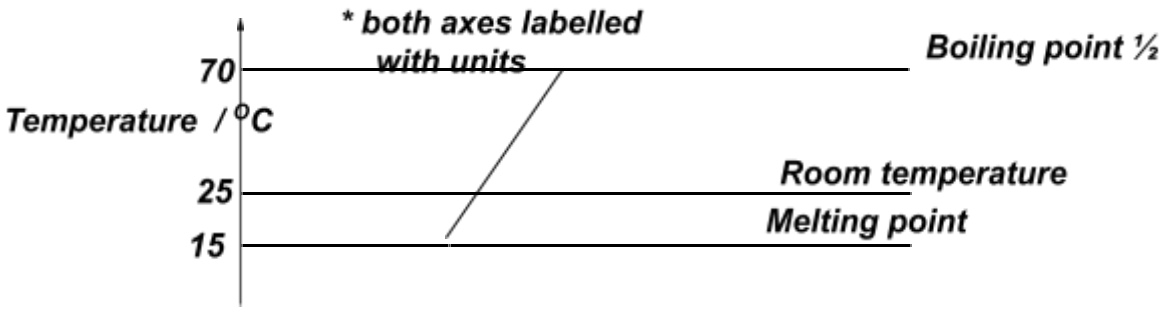
   OR

   $2NaHCO_{3aq} \longrightarrow Na_2CO_3 + CO_{2(g)}n + H_2O_{(e)}$

   $Ca(HCO_3)_{2\,(aq)} \longrightarrow CaCO_{3(s)} + CO_{2\,(g)} + H_2O_{(e)}$

   HEAT must be mentioned or implied.

11. *a)*



Time (minutes)

b) Liquid

12. *(i) Range of boiling points / no sharp boiling points*
(ii) Carry out fractional distillation

13. *(i) Evaporation*
(ii) Uses a lot of fuel
(iii) Any soluble salt and water

14. *Melting points is the specific √ ½ constant temperature√ ½ for a particular substance when a solid √ ½ change to a liquid√ ½*

16. *(a) To cool/condense vapour. √1* *(1 mk)*
(b) Water. √1 *(1 mk)*
(c) Blue solid √1 changes to white solid. √1 *(1 mk)* — *3*

17. *(a) Solvent front √*
(b) C √

18. *a) Chemical √ ½*
b) Physical √ ½
c) Physical √ ½
d) Chemical √ ½

19. *- Smoky/ sooty √*
- Not hot enough √

20. *a) Chemical √ ½*
b) Physical √ ½
c) Physical √ ½
d) Chemical √ ½

21. *- Smoky/ sooty √*
- Not hot enough √

22. *- Boiling point*
- Melting point
- Density
- Refractive index

23. *i) Pass the mixture of gases through concentrated sulphuric (vi) acid √ ½ . Ammonia and ethane will dissolve √ ½*
- Hydrogen √ ½ being insoluble √ ½ is then obtained

24. *a) i)*

ii) A and C

b) Since NH4CL sublimes but CaCL2 does not, sublimation process would do. Heat the mixture, NH4CL sublimates into vapour and condences on the upper cooler parts of the test tube. CaCL2 remains at the bottom of the heating tube

c) i) Fractional distilation
ii) Separating funnel method 8

Since the two liquids are immiscible pour the mixture into the separating funnel and allow to settle. The denser liquid will settle down and the less dense one will form the second layer on top. Open the tap and run out the liquid in the bottom layer leaving the second layer in the funnel

25. *(i) Condenser*
(ii) To indicate when a liquid is boiling, a thermometer reads a constant temperature
(iii) A
(iv) Ethanol
Reason:- It has a lower boiling of 78°C compared to water with a boiling point of 100°C
or - The liquid with the lower boiling point boils first and its vapours are condensed and the condenser to be collected as the first distillate
(v) Fractional distillation
(vi) - To separate components of crude oil
- To isolate O_2 and N_2 from air
- To manufacture spirits
(vii)- They are immiscible liquids
- They have different but close boiling points

26. *(a) Wire gauze*
(b) Sodium chloride solution (or any named slat solution)
(c) Evaporation

27. *a) i) – Colourless liquid is seen on the cooler parts of the test tube.* ☕*1 mk.*
- Blue crystals change to a white powder. ☕*1 mk*

ii) Water ☕*1 which was originally water crystallization.*
$CuSO_4 , 5H_2O(s) \longrightarrow CuSO_4(s) + 5H_2O(l)$ ☕*1*

b) NaOH(s) absorbs water from the air and forms a solution. It is a deliquescent substance. ☕*1*
Anhydrous $CuSO_4$ absorbs water from air to form hydrated Copper (II) sulphate which is blue but no solution is formed ☕*1 it is hygroscopic*

28. *a)i)Ethanol, acetone (any organic solvent)*
ii) Its <u>most soluble</u> in the solvent and less sticky
iii) - Cut out the yellow pigment
- put in organic solvent to dissolve the pigment
- filter and evaporate the filtrate to get the pigment
iv)Above the red pigment and below the edge.

b)-Heat the mixture aluminum chloride sublime and collect be cooler part of the tube and sodium chloride left at bottom of the tube
- Scratch the condense $alcl_3$ place in a beaker
(c)Add cold water to the mixture, and stir to dissolve R. Filter to get solid S and V on residue . Evaporate the future to get R. put S and in no water and stir to dissolve and filter to get S as residue evaporate future to get V

29. *Add cold water to the mixture, and stir to dissolve R. Filter to get solid S and V on residue . Evaporate the future to get R. put S and in no water and stir to dissolve and filter to get S as residue evaporate future to get V*

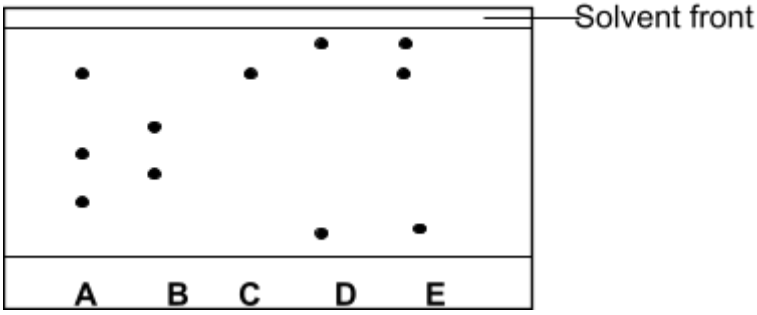
30. *Heat the mixture Ammonium chloride sublimes and is collected on the cooler parts. Add water to the remaining mixture, stir and filter. Lead (ii) Oxide remains as residue. Evaporate the*

filtrate to dryness to obtain sodium chloride

31. *a)* *- Fractionating column must have beads*
- Wrong cold water circulation in the condenser
b) *T*

32. *a) Sublimation.* ✓*1* *(3 mks*
b) Bleaching ✓*1*
c) Polymerisation ✓*1*

33.



(a) See Diagram above

- Solvent front should be slightly above the furthest pigment

(b) C

- It contains only one pigment ½

34 ***. - Add either to the mixture. Stir and filter***

- Add alcohol to the residue, stir and filter

- Evaporate to filtrate to obtain C

35. ***- Black crystals changes directly into purple vapour√1***

- The iodine crystals (sublimes) changed directly into a purple vapour without passing liquid state and changed back to black iodine crystals on the upper cooler parts of boiling tube√ (Correct colour must be stated 2 mks