11.3   Chemistry Paper 3 (233/3)

1.   Table 1

	I	II	III
Final burette reading	29.70	33.40	44.60
Initial burette reading	0.00	4.00	15.30
Volume of solution **A** used (cm^3)	29.70	29.40	29.30

(4 marks)

(i)   average volume $= \dfrac{29.4 + 29.3}{2}$

$= 29.35 cm^3$ (½ mark)

(ii)   concentration of the dibasic acid **A**;   (2 marks)

$conc = \dfrac{1.6}{126} = 0.01269; \; 0.01269 \times 4 = 0.05M$

(iii)   moles of the dibasic acid used;

$= \dfrac{29.35}{1000} \times 0.05$

$= 0.0014675 \text{ moles}$

(1 mark)

(iv)   moles of NaOH in 25.0cm^3.

$= (0.0014657 \times 2) \qquad = \qquad 0.002935 \text{ moles}$

(1 mark)

(v)   The concentration of NaOH in moles per litre.

$= 25.0 \text{ cm}^3$ of NaOH   0.002935

1000cm^3 $= \qquad 0.1174 \text{ M}$

(2 marks)

2.

Table II

	1st conical flask	2nd conical flask
Final burette (cm^3)	21.20	33.60
Initial burette (cm^3)	9.70	22.20
Volume of solution **A** used (cm^3)	11.50	11.40

(3 marks)

(i)   average volume; $= \dfrac{11.4 + 11.5}{2}$

$= 11.45 \text{ cm}^3$ (½ mark)

(ii)　moles of the dibasic acid　$= \dfrac{0.05 \times 11.45}{1000}$

　　　　　　　　　　　　　　　$=$　0.0005725 moles　　　　　　(1 mark)

(iii)　moles of NaOH that reacted with the dibasic acid.
　　　　$=$　(0.0005725×2)

　　　　$=$　0.001145 moles

　　　　　　　　　　　　　　　　　　　　　　　　(1 mark)

(iv)　moles of NaOH that reacted with 25.0cm^3 of salt **B** in solution **B**;

　　　$=$　0.0029314 - 0.001145

　　　$=$　0.0017864 moles

　　　　　　　　　　　　　　　　　　　　　　　　(2 marks)

(v)

　　I.　moles of salt **B** in 25.0cm^3 of solution **B**;

　　　$\dfrac{0.0017884 \times \frac{1}{2}}{6}$　　$=$　0.00089 moles

　　　　　　　　　　　　　　　　　　　　　　　　(1 mark)

　　II.　concentration in moles per litre of salt **B** in solution **B**;　　(1 mark)

　　　　$=$　$0.00089 \times \dfrac{1000}{25}$

　　　　　　　　$=$　0.0357 M　　　　　　　　　(1 mark)

　　III.　relative molecular mass of salt **B**;

　　　　$=$　$\dfrac{4.73}{0.0357}$

　　　　　　　　$=$　133.0　　　　　　　(1 mark)

2　(a)

(i)

Observations	Inferences
- Gas which turns red litmus paper blue - Brown solid formed	NH_4^+ present
(2 marks)	(1 mark)

　　　　　　　　　　　　　　　　　　　　　　　　(3 marks)

(ii)

Observations	Inferences
- Yellow / brown solution - Brown ppt	Fe^{3+} formed
(1 mark)	(1 mark)

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(b) (i)

Observations	Inferences
- White ppt formed (1 mark)	CO_3^{2-}, SO_3^{2-}, SO_4^{2-} (2 marks)

(ii)

Observations	Inferences
I White ppt dissolved/disappears Effervescence occurs (1 mark)	SO_3^{2-}, CO_3^{2-} (1 mark) (2 marks)
II Changes from orange to green (1 mark)	SO_3^{2-} present (1 mark) (2 marks)

3 (a)

Observations	Inferences
- Burns with a blue flame (1 mark)	Saturated compound or Short-chain hydrocarbon (1 mark)

(b)

Observations	Inferences
- No effervescence (1 mark)	Not acidic (1 mark)

(c)

Observations	Inferences
- colour changes from orange to green (1 mark)	R - OH present (1 mark)

12.4 GENERAL SCIENCE (237)

12.1 General Science Paper 1 (237/1)
### SECTION A -BIOLOGY (34 marks)

1. (a) Zoology; (1 mark)

   (b) To sort and group organisms;

   For uniformity in identification;

   Organise information in an orderly manner to avoid chaos;

   Put Organisms into correct groups to make their study easy.

   (2 marks)

   (c) Production of energy; (1 mark)

2. (a) Cell wall; chloroplasts; sap vacuole (2 marks)

   (b) Hold the microscope firmly with both hands

   (one hand at the arm and the other at the base);

   Place the microscope away from the edge of the table.

   (2 marks)

3. (a) Hypertonic; (1 mark)

   Solution of high concentration.

   (b) Through osmosis, the plant lost water to the soil environment; this caused the

   plant to droop; (2 marks)

   Plant cells lost water -H_2O to the high concentration;

   Through osmosis cells flaccid leading to dropping/witting.

4. (a) Carbon (IV) Oxide; water; (any one correct) (1 mark)

   (b) Closely packed to protect inner cells;

   Lack of chloroplasts/transparent to allow light to pass through; the cells are

   one layer thick/thin in diameter to allow light to penetrate easily;

   (any 2 correct) (2 marks)

5. (a) Ingestion is taking in food material through the mouth while egestion is the

   removal of undigested/indigestible food materials thought the anal opening;

   (1 mark)

   (b) (i) in X glucose/amino acids/vitamins; (1 mark)

   (ii) in Y fatty acids/glycerol. (1 mark)

6. Burning charcoal stove reduces the amount of oxygen in the room leading to partial

   burning; which produce carbon(II) oxide; when inhaled it combines permanently with

   haemoglobin/blocking uptake of oxygen; (3 mark)

7.   (a)   Pneumococcus/Diplococcus pneumoniae/streptococcus pneumonial/stephilococcus

           auries;   (1 mark)

      (b)   High vascularization; ventilation mechanism;   (2 marks)

      (c)   Produce carbon (IV) oxide that raises dough;   (1 mark)

8.   (a)   Leaves are tiny/small; reducing the surface area over which transpiration occurs/rate

           of transpiration is reduced;

           Thick, shinny cuticle; reduce rate of transpiration;   (2 marks)

      (b)   Elongated cells; to provide a large surface area for nutrients/water absorption;/Thin;

           to facilitates diffusion of substances;   (2 marks)

9.   (a)   Excretion; osmoregulation;

           PH regulation;

           Ionic balance.

                                                       (2 marks)

      (b)   Water; salts;   (2 marks)

10.   More blood flows closer to the skin;

      More heat is lost cooling occurs;   (2 marks)

SECTION B: CHEMISTRY -- (33 marks)

11.   Valency - combining power of an element/radical; or number of electron gained or lost by an

          atom   (1 mark)

     Electron affinity - energy released when an atom acquires an electron;   (1 mark)

12.   R;

     R is the smallest atom with its outermost electrons near the nucleus hence strongly attracted;

                                                                 (2 marks)

13.   (a)   Gases in air are separated by physical means;

      (b)   Both require oxygen gas;

      (c)   Hydrogen peroxide;

      (d)   Magnesium has high affinity for the combined oxygen;heat produced by burning

            magnesium, decomposes carbon (VI) oxide to carbon and oxygen.   (4 marks)

14.   (a)
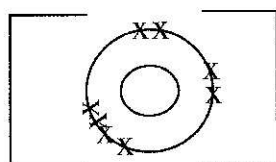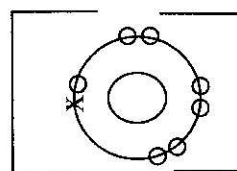
                    Na$^+$ Cl$^-$ (2 marks)

      (b)   Covalent bond;   (1 mark)

15.   Add water to the mixture, warm and stir, sugar will dissolve;

Filter the mixture to obtain sand as a residue; (2 marks)

16. (a) To measure the acidity and alkalinity of a solution;/measure the strengths of acids and Bases.

(b) Strong acid is one that dissociates fully to give more hydrogen ions;

(c) $2HCl + CaCo_{3(s)} \longrightarrow CaCl_{2(aq)} + Co_{2(g)} + H_2O_{(l)}$;

(d) Waste of soap;/not economical
formation of scum stains on clothes (5 marks)

17. (a) Use anhydrous Copper (II) Sulphate; if it changes form white to blue when in contact with the substance then water is present; /blue anhydrous cobalt chloride paper of cobalt sulphate to pink

(b) Magnesium hydroxide; (3 marks)

18. (a) Mobile ions;
(b) Delocalised electrons; (2 marks)
19. (a) R - freezing/solidifying;
S - Condensation/liquefying;

(b) Chromatography;/paper chromatography

(3 marks)

20. (a) X;

(b) W; W is an alkali metal
Z is a noble element which is stable; Since it has an octet structure or is in group VIII
(c) 2.8.7; (4 marks)

21. (a) double decomposition/precipitation;

(b) $2NaNO_{3(s)} \xrightarrow{\text{heat}} 2NaNO_{2(s)} + O_{2(g)}$;

(c) Salt that contains replaceable hydrogen atoms; (3 marks)

PHYSICS - SECTION C - (33 marks)

22. (a) Burette (1 mark)

(b) Vol of 40 drops = 42.5 - 26.8
= 15.7cm³

Vol of 1 drop = $\dfrac{15.7}{40}$ = 0.39
≈ 0.4cm³ (2 marks)

23. (a) Nature of the surface/roughness/smoothness; Normal reaction.

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(b) Attraction forces between molecules of the liquid is less than the attraction of the liquid molecules and glass molecules/adhesive forces are greater than cohesive forces.

(2 marks)

24. (a) Density of B is greater than that of A. (1 mark)

(b) Smoke particles are hit by air molecules which are moving in a (continuos) random motion.

(2 marks)

25. In the morning air is cold and the cable contracts becoming shorter.
At midday the air is hot and the cable expands becoming longer hence sags. (2 marks)

26. When heated the water molecules expand and become less dense.
They rise up and cooler more dense water molecules move downwards. (2 marks)

The potassium paramagnet colour moves up with the less dense molecules hence the colour strains curve up as the water moves in convectional currents. (1 mark)

27. (a) at 50cm mark/or on dieagram.

(1 mark)

(b) weight acts at the 50cm mark.
Clockwise moments = anticlockwise moments
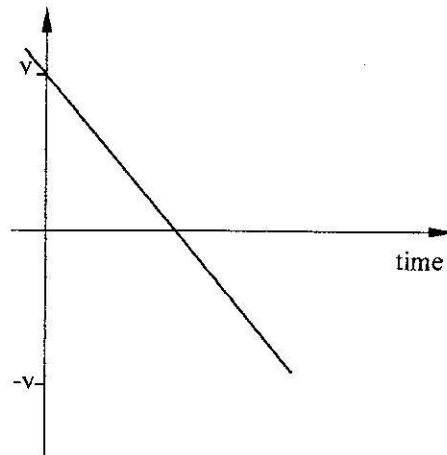$$m \times 10 = 40 \times 30$$
$$10\,m = 1200$$
$$m = 120g$$ (2 marks)

28. (a) neutral (1 mark)

(b) When the ball bearing is slightly tilted, the position of centre of gravity remains unchanged. (2 marks)

29. $K = \dfrac{F}{e}$

$= \dfrac{150 \times 10^{-3} \times 10}{20 \times 10^{-3}}$

$M = \dfrac{Ke}{g}$

$= \dfrac{150 \times 10^{-3} \times 10}{20 \times 10^{-3}} \times \dfrac{30 \times 10^{-3}}{10}$

(3 marks)

$= 225g$

30.

(2 marks)

31.   Before the brakes are applied the box was moving at the same speed as the lorry.
It continues moving forward due to its inertia when the brakes are suddenly
applied/obeys Newton's first law of motion..

(2 marks)

32.   (a)   2.

(1 mark)

(b)   - weight of the pulley
- amount of friction between the pulley and the string.

(2 marks)

33.   (a)   A floating body displaces its own weight of the fluid in which it floats.   (1 mark)

(b)   The ship is "hollow" and therefore it's average density is less than that of water.

(2 marks)