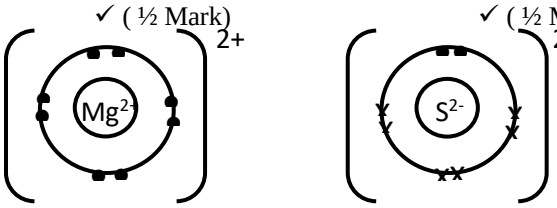
MARKING SCHEME CHEMISTRY FORM TWO KIKUYU SUB-COUNTY END YEAR 2018

1. – It is blue in colour✓
   - It has three zones (almost colourless zone, green blue zone, pale blue zone) ✓
   - Gives only a little light because it contains fewer hot carbon particles ✓ ***(Any 2 correct 2 Marks)***
   - Its hotter than luminous flame and doesn't produce soot which dirtifies the apparatus. ✓***(1 Mark)***
2. (i) Between (100 and 108)0C. ✓1
   (ii) Impure water ✓ (½ Mark)
   It boils over a temperature range √ (½ Mark)
   (iii) It raises the boiling point of the water. ✓1
3. (i) $CaCO_{3\,(s)} + H_2SO_{4\,(aq)} \longrightarrow CaSO_{4\,(s)} + H_2O_{(l)} + CO_{2\,(g)}$✓ 1
   NB: - Equation must be balanced otherwise award 0
   - State symbols a must if not less ½ mark
   - The reaction just <u>starts and stops immediately</u>✓1
   (ii) The $CaCO_3$ is <u>coated by the insoluble</u>✓ ½ $CaSO_4$, cutting <u>the contact between</u>✓ ½ the acid and thus reaction stops.
4. (a) It reacts with the <u>oxygen</u>✓ ½ present there and also with <u>nitrogen</u>✓ ½ gas present there.
   (b) $2Mg_{(s)} + O_{2\,(g)} \longrightarrow 2MgO_{(s)}$✓ 1 Mark
   $3Mg_{(s)} + N_{2\,(g)} \longrightarrow Mg_3N_{2(s)}$✓ 1 Mark
5. (i) - NO 1Mark
   - The gas is <u>less dense than air</u> (✓ ½ Mark) hence can't be collected by <u>downward</u> delivery.
   (ii) Concentrated sulphuric (VI) acid (✓ 1 Mark) *reject if "concentrated" is missing.*
   (iii) - It's colourless✓
   - Odourless✓
   - Less dense than air ✓
   Any two for (½ mark) each
6. (a) (i) 2.8.8.1 ✓ (½ mark)
   (ii) 2.8.8 ✓ (½ Mark)
   (b) - Ionic radius is <u>smaller</u>✓ (½ mark) than its atomic radius.
   - After forming an ion, <u>an electron is lost leaving</u>✓ (½ mark) fewer electrons.
   - Same nuclear charge is exerted over <u>fewer electrons</u>✓ (½ mark) hence they're more attracted to the nucleus reducing <u>the ionic radius</u>✓ (½ mark)
7. (a) The magnesium continue to burn ✓ (1 mark) in the gas jar producing a white solid i.e. magnesium oxide and black specs i.e. carbon. This is because the heat produced decomposes ✓ (1 mark) $CO_{2\,(g)}$ to carbon and oxygen which supports the burning of magnesium.
   (b) $2Mg_{(s)} + CO_{2(g)} \longrightarrow 2MgO_{(s)} + C_{(s)}$ ✓ (1 mark)
8. (a) ✓ (½ Mark) ✓ (½ Mark)



✓ ½ mark – *charges shown on both ions*

   (b) Giant ionic structure ✓ ½ mark
   (c) - Have high melting and boiling points ✓ ½ marks
   - Conducts electricity in molten or aqueous state ✓ ½ mark
   - Soluble in polar solvents like water ✓ ½ mark ***Any 2 for ½ m = 1m***
9. Put the sodium carbonate salt into water in a test tube and stir to form a solution of <u>the salt</u>✓ ½. Put the Lead (II) nitrate in water in a test-tube too and stir to make <u>a solution of the salt</u>✓ ½ . React <u>equalportions</u> ½ of the two solutions in a boiling tube where Lead (II) carbonate ½ is precipitated out at the bottom. <u>Filter the mixture</u>✓ ½ to obtain Lead <u>(II) carbonate</u> precipitate as residue. <u>Wash it with distilled water and dry it</u> between <u>two blotting</u>✓ ½ papers to obtain dry crystals of the salt.
10. (a) Calcium oxide// Quick line ✓ 1 mark
    (b) Filtration// Fractional crystallization/ crystallisation of $NaHCO_3$. ✓ 1
    (c) - Manufacture of glass

- Water softening
- Manufacture of NaOH
- Manufacture of laundry detergents
- Paper making process
- In textile *(Any to correct answers award ½ marks each)*

11. (a) X – 2, 8, 3 Group III ✓ ½
Y – 2, 8, 6 Group VI ✓ ½
(b) X - Atomic number = 13 ✓ ½
Y – Atomic number = 16 ✓ ½

12. (i) Sodium peroxide ✓ 1
(ii) $Na_2O_{2(s)} + H_2O \longrightarrow 2NaOH_{(aq)} + O_{2\,(g)}$ ✓1
(iii) - Potassium manganate VII ✓ ½
- Sodium Nitrate/Potassium Nitrate ✓ ½

13. P and S ✓1
Zinc hydroxide is amphoteric and reacts with both acids and bases ✓1

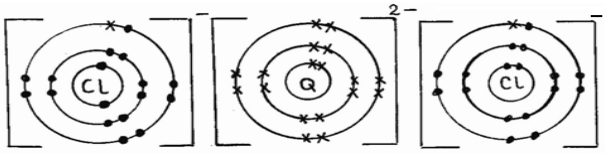
14. (i) Down the group atomic radius increases due to increase in number of energy levels as the number of electrons Increases ✓1
(ii) Each ion is formed by gaining an electron, this increases✓1 the electron repulsion in the outermost energy level hence✓1the size increases.

15. (i) X – Fractionating column ✓½
Y – Lie big condenser ✓½
(ii) To condense back the component of higher boiling point ✓1
(iii) Shown on the diagram on the lower side of the condenser ✓½
(iv) Fractional distillation✓½

16. (a) (i) ($CuCO_3$) Copper Carbonate ✓1
(ii) (CuO) Copper (II) Oxide ✓1
(Ignore formula)
(b) $CuO_{(s)} + H_2SO_{4\,(aq)} \longrightarrow CuSO_{4(aq)} + H_2O_{(l)}$ ✓1

17. (a) To expel all the air present in the boiling tube ✓1
(b) Zinc powder turned yellow when hot and white on cooling ✓1
(c) Hydrogen gas ✓1

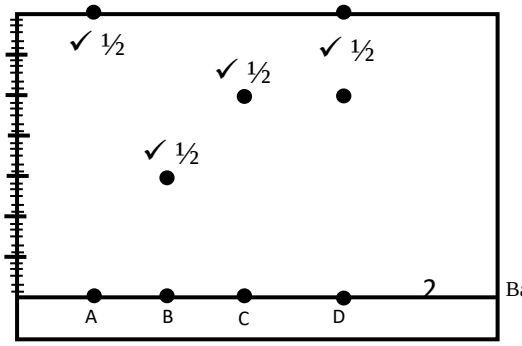
18. (a) P – 2 (½mk) PO (½mk)
Q – 20 (½mk)
R – 19 (½mk)
T – 2.8.8 (½mk) TO_2 (½mk)
(b) R (1mk) – Has four energy levels and requires to loose only one electron to be stable. (1mk)
(c) Ionic bond. (1mk)
(d) QCl_2



(2mks)

(e) T is a non-metal which is insoluble in water. (1mk)
(f) S ✓ (1mk) – Has more protons than T hence easily attracts an electron.

19. (a) (i)



Baseline ✓ 1

(ii) A and C ✓ 1

(b) Place the mixture in a beaker and cover it with a watch glass containing cold water ✓ ½. Heat the mixture. Ammonium Chloride sublimes ✓ ½ and collects on the cooler parts of the watch glass while Sodium Chloride which does not sublime remains in the beaker. ✓ 1

(c) (i) Fractional distillation ✓ ½

(ii) Since the two liquids are immiscible,pour the two in a separating funnel and allow them to settle ✓ ½ The dense liquid settles at the bottom and the less dense forms a second layer on top ✓ ½. Open the tap and run out the liquid✓½ in the bottom layer leaving the liquid in the upper layer.✓ ½.

(d) (i) Fractional distillation ✓ ½

(ii) Molecular mass/density/. ✓ 1

20.I. (a) $2CO_{(g)} + O_{2(g)} \longrightarrow 2CO_{2(g)}$ ✓1

(b) - Reduction. ✓1

(c) - Extraction of metals. ✓1

II.

(a) - Calcium carbonate. ✓1
- Brine / saturated sodium chloride. ✓1
- Coke.✓1 (any 2)

(b) - Regulating the flow of brine into the solvay tower. ✓1

(c) - The reactionis exothermic. ✓1

(d) $NaCl_{(aq)} + NH_{3(aq)} + CO_{2(g)} + NH_{3(g)} \longrightarrow NaHCO_{3(s)} + NH_4Cl_{(aq)}$

(e) - Filtration.

(f) - Less soluble at low temperatures. ✓1

(g) - Ammonia✓½
- Carbon (iv) oxide✓½ } Each ½ mk max. 2
- Water ✓½

(h) - To minimize the cost ✓½and to reduce the pollution✓½ effects.

(i) $Cacl_2$ / Calcium chloride. ✓½

21. a) i) Halogen

ii) Alkaline earth metals

b) i) $T_2(SO_4)_3$

ii) $J(NO_2)_2$

c) i) Ionic
Giant ionic

ii) Covalent
Simple molecular

d) i) E reacts by gain of electrons which experiments repulsion from the existing electrons thereby decreasing the effective nuclear charge

ii) Increase in strength of the covalent bonds in the oxide of L than of G/L has great atomic structure while G has simple molecular structure.

iii) The nuclear charge increase across the period hence greater attraction. WJT are metals, the more the delocalized es the stronger the metallic bond.

22.(i) - Chemical process.✓½ It is an exothermic process giving rise to acidic solution which is a new substance.

(ii) - Blue litmus turns red✓½ which the red litmus unchanged. ✓½
- Hydrolysis occurred. ✓½

OR $AlCl_{3(s)} + 3H_2O \longrightarrow Al(OH)_{3(s)} + 3HCl_{(aq)}$

23.(a) Q and S (1mk)

They have the same number of protons // atomic number. (1mk)

(b) 39 – 19 = 20 (1mk)