

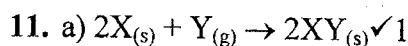
FORM TWO EXAMINATION
KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E)

Chemistry (233)
October 2016

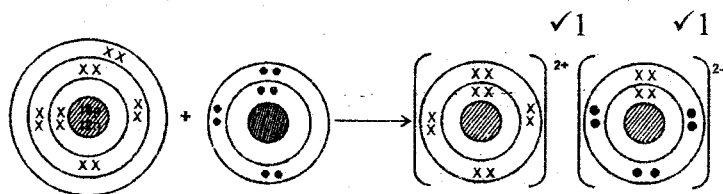
MARKING SCHEME

1. a) Lead (II) oxide ✓ 1
b) Hydrogen ✓ 1
c) Hydrogen ✓ 1
d) Lead (II) oxide ✓ 1
2. a) Q - Iron (III) chloride ✓ 1
R - Calcium chloride ✓ 1
b) Q sublimes
c) To provide a cool surface for the sublimate to form ✓ 1
3. a) Chemical ✓ 1
b) Physical ✓ 1
c) Chemical ✓ 1
4. a) C and E ✓ 1 - contain equal numbers of protons ✓ 1 / atomic numbers.
b) Neutrons in D = 4 ✓ 1
5. a) Covalent bond
b) Co-ordinate bond / dative bond
6. a) Colour of solid change from black to red-brown ✓ 1
b) $\text{CuO}_{(s)} + \text{CO}_{(g)} \rightarrow \text{Cu}_{(s)} + \text{CO}_{2(g)} \checkmark 1$
c) CO is poisonous gas, should not be released into the atmosphere ✓ 1
7. a) Wrong method of gas collection. Hydrogen is less dense than air hence upward delivery method should be used. ✓ 1
b) Concentrated sulphuric (VI) acid ✓ 1
c) Dilute HCl or dilute $\text{H}_2\text{SO}_4 \checkmark 1$
d) $\text{Zn}_{(s)} + 2\text{HCl}_{(aq)} \rightarrow \text{ZnCl}_{2(aq)} + \text{H}_{2(g)} \checkmark 1$
OR
 $\text{Zn}_{(s)} + \text{H}_2\text{SO}_{4(aq)} \rightarrow \text{ZnSO}_{4(aq)} + \text{H}_{2(g)} \checkmark 1$
e) - Weather balloons ✓ 1
- Oxy-hydrogen flame used for welding and cutting metals ✓ 1
- As rocket fuel when mixed with oxygen
- Manufacture of ammonia
- Manufacture of hydrochloric acid

8. a) Boiling water expels ✓ 1/2 dissolved oxygen, the oil and anhydrous $\text{CaCl}_2 \checkmark 1/2$ layers prevent incoming air from the atmosphere.
b) - Air/oxygen ✓ 1/2
- Moisture/water ✓ 1/2
c) - Acidic conditions ✓ 1/2
- Salty conditions ✓ 1/2
9. A: Ammonia solution ✓ 1
B: Hydrochloric acid ✓ 1
C: Ethanoic acid ✓ 1
D: Sodium hydroxide ✓ 1
10. a) $\text{Na}_2\text{O} \checkmark 1$
b) $\text{ZnO} \checkmark 1$
c) $\text{SO}_2 \checkmark 1$
d) $\text{NO} \checkmark 1$



- b) Ionic bond ✓ 1. X is a metal while Y is a non-metal ✓ 1
c)



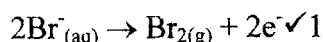
12. a) $\text{Mg}_{(s)} + 2\text{HCl}_{(aq)} \rightarrow \text{MgCl}_{2(aq)} + \text{H}_{2(g)} \checkmark 1$
b) The reaction with alkali metals is explosive ✓ 1
c) Silver and copper are lower than hydrogen in the reactivity series thus cannot displace hydrogen from the acid ✓ 1
d) Dilute HCl reacts with lead to form insoluble lead (II) chloride ✓ 1
13. a) Non-luminous flame ✓ 1
b) When the air hole is completely opened ✓ 1
c) P ✓ 1 - contains completely burnt gas ✓ 1
d) R ✓ 1 - contains unburnt gases ✓ 1

14. i) a) Electrolyte - A compound which in solution or molten state conducts electricity and is decomposed by the current ✓1
 b) Non-electrolyte - substance which not conduct an electric current whether in solution or molten state ✓1
 c) Conductor - solid substance which allows passage of electricity through it ✓1

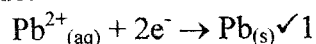
ii) a) In molten state ions responsible for the conduction of electricity are free and mobile, ✓1 while in solid state ions are fixed and not mobile.

b) Bromine vapours are highly poisonous ✓1

c) Anode:



Cathode:



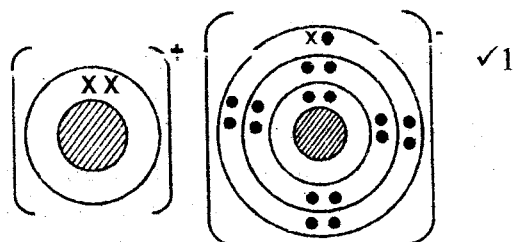
15. i) Alkaline earth metals ✓1
 ii) A: ✓1 It has a stable electronic arrangement (duplet) ✓1
 iii) Covalent bond: Because electronic are shared between B and E, ✓1
 iv) G belongs to period 3, Group 5 ✓1 (on the right of B)

16. a) Hydrogen ✓1

- b) Calcium hydroxide ✓1 formed ionises partially producing few OH⁻ ions ✓1
 c) Test for presence of carbon (IV) oxide ✓1
 d) $\text{Ca}(\text{s}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow \text{Ca}(\text{OH})_2(\text{aq}) + \text{H}_2(\text{g}) \checkmark 1$

17. a) Period 2, it has 2 energy levels

- b) i) A₂ has more protons than A₁ ✓1 so the higher nuclear charge in A₂ gives a stronger attraction for electrons and energy levels. ✓1
 ii) A₄ forms its ions by gaining electrons which reduces the force of attraction by nucleus and is also repelled by other electrons in the atom. ✓1
 c) A₂ ✓1: Has same number of electrons ✓1 (3) as A₃ in the outermost energy level.
 d)



18. a) Gas A - Carbon (IV) oxide ✓1
 B - Ammonia ✓1

- b) Liquid C - Ammonium chloride ✓1
 Solid D - Sodium hydrogen carbonate ✓1
 c) Tower P: $\text{NH}_3(\text{g}) + \text{H}_2\text{O}(\text{l}) + \text{NaCl}(\text{aq}) \rightarrow \text{NH}_4\text{Cl}(\text{aq}) + \text{NaHCO}_3(\text{s}) \checkmark 1$
 Chamber R: $2\text{NH}_4\text{Cl}(\text{aq}) + \text{Ca}(\text{OH})_2(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + 2\text{NH}_3(\text{g}) + \text{H}_2\text{O}(\text{l}) \checkmark 1$
 d) $2\text{NaHCO}_3(\text{s}) \xrightarrow{\text{heat}} \text{Na}_2\text{CO}_3(\text{s}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g}) \checkmark 1$
 e) - In glass making ✓1
 - Softening hardwater
 - Manufacture of sodium silicate used for manufacture of detergents
 - In paper industry
 f) Carbon (IV) oxide ✓1 and ammonia ✓1

19. a) Electrostatic precipitation. ✓1
 b) Conc. sodium hydroxide / conc. potassium hydroxide ✓1
 c) To increase surface area for cooling to freeze the water vapour
 d) -186°C - Argon ✓1
 -196°C - Nitrogen ✓1
 -183°C - Oxygen ✓1
 e) - Aid patients with breathing difficulties (mountain climbing / deepsea diving and mountaineering)
 - In oxy-hydrogen flame for welding ✓1
 - In oxy-ethyne flame for welding
 - In extraction of iron from its ore
any two correct