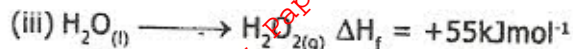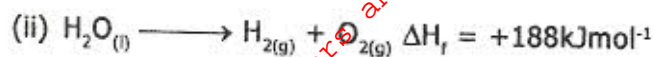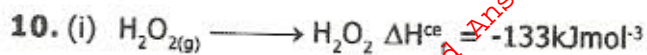# K.C.S.E. 2007 CHEMISTRY PAPER 233/1 MARKING SCHEME

1. (a) Carbon (IV) Oxide
   (b) Blue flame, Carbon (II) oxide is burning

2. Mass in 500cm³ = 15 × 1.05 = 15.75g
   Mass in 1000cm³ = 15.75 × 2 = 31.5g

   Molarity $= \dfrac{31.5}{60} = 0.103\,M$

3. (a) Group (VIII) elements
   (b) Chlorine molecule is smaller and the strength of Vander Waals forces between molecules of chlorine is weak as compared to iodine.

4. C - unburnt
   D - luminous yellow flame

5. The product from nettle plant is acidic aqueous ammonia solution being basic neutralize the acidic product.

6. (a) (i) Colour change from green to brown
       (ii) Reddish brown precipipate

   (b) $Fe^{3+}_{(aq)} + 3OH^-_{(aq)} \longrightarrow Fe(OH)_{3(s)}$

7. (a)
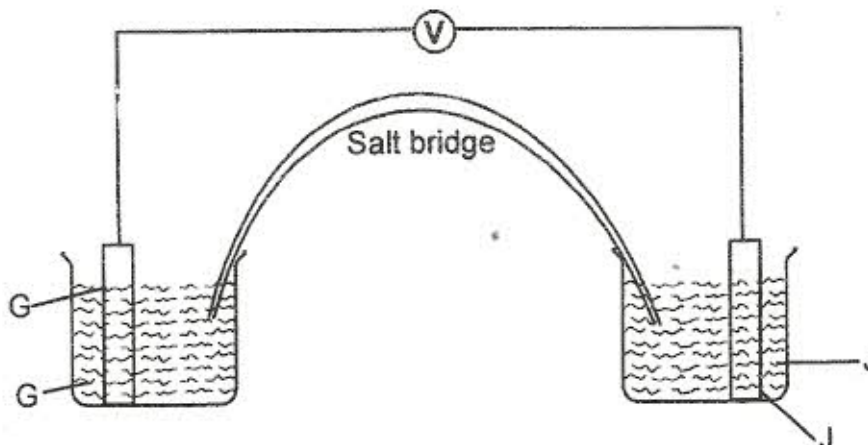
   (b) E^θ cell = E^θ reduced = E^θ oxidized
       = - 0.14v - -0.74v = + 0.6v

8. Across the period there is a gradual increase in number of protons in the nucleus. This increases the force of attraction between the nucleus and the electrons.

9. (a) Dilute nitric acid

   (b) Silver metal

   (c) Oxygen

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10. (i) $H_2O_{2(g)} \longrightarrow H_2O_2 \quad \Delta H^{ce}_d = -133 kJmol^{-3}$

(ii) $H_2O_{(l)} \longrightarrow H_{2(g)} + O_{2(g)} \quad \Delta H_f = +188 kJmol^{-1}$

(iii) $H_2O_{(l)} \longrightarrow H_2O_{2(g)} \quad \Delta H_f = +55 kJmol^{-1}$

11. - It is more dense than air.
    - It will react with calcium oxide since CO_2 is acidic and CaO is basic.

12. (a) The volume of a fixed mass of gas is directly proportional to its temperature is Kelvin.

(b) $\dfrac{P_1V_1}{T_1} = \dfrac{P_2V_2}{T_2}$

$$T_2 = \frac{291 \times (1.0 \times 10^5) \times 2.8 \times 10^{-2}}{(1.0 \times 10^5) \times 3.5 \times 10^{-2}}$$

$$= 2328K$$

13. (a) (i) Deliquescency
(ii) Esterification

(b) Thermal crucking

14. (a) Nuclear fusion is where two light nuclei combine to give a heavy release of energy while nuclear fussion is where a large nucleus splits into smaller nuclei with the release of enormous amount of energy.

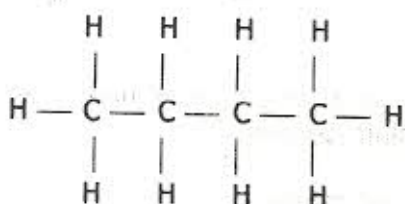(b) Wrap with aluminium or lead foil and bury them deep underground.

15. (a) The calcium and magnesium compounds in this water cannot be decomposed by heating i.e. $CaCl_2$, $CaSO_4$, $MgSO_4$ and $MgCl_2$.

(b) Ionic exchange
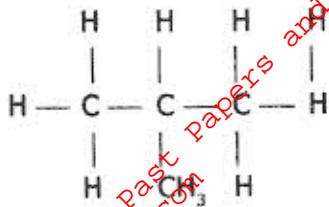Uses sodium carbonate (washing soda)

16. (a) O_{-2}

(b) $[Zn(OH)_4]^{-2}$

17.

Butane

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2-Methyl propane

18. - React Sodium with water to get sodium hydroxide.
    - Bubble into this solution excess carbon (IV) oxide to get sodium hydrogen carbonate.
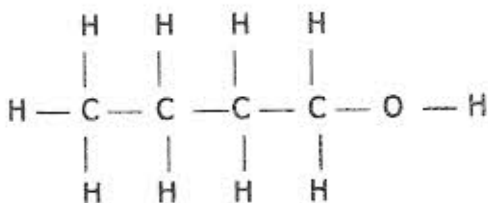
19. (a) Froth floatation

(b) $ZNCO_{3(s)} \longrightarrow ZnO_{(s)} + CO_{2(g)}$

(c) Manufacture of dry cells. Zinc casing forms the anode of dry cells.

20. (a)

Element	C	H	O
%	$\frac{64.9}{12}$	$\frac{21.6}{16}$	$\frac{13.5}{1}$
moles	5.41	1.35	13.5
Ratio	4	1	10

(E.F. = C_4H_9OH)

(b)

21. (a) Chloride ions in brime are high concentration compared to oxide ions in solutions.
    (b) Hydrogen gas

22. $Al_2(SO_4)_3 \longrightarrow 3SO_4^{-2} + 2Al^{3+}$

Moles a^{2}Al$_2$(SO$_4$)$_3$ = $\frac{6.84}{342} = 0.02$

Moles a^{2}SO$_4^{-2}$ = $0.02 \times 3 = 0.06$

23. Penten-1 Al is polar. There are two forces, Van der Waals and hydrogen bonds holding its molecules together. Pemtane is non-polar.

24. White flames produced, ammonia react with chlorine producing hydrogen chloride gas which react with excess ammonia to give ammonium chloride.
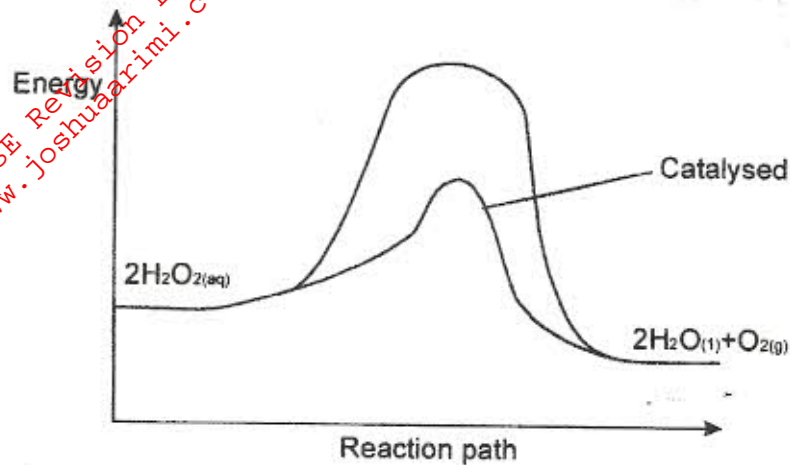
25. (a) No change in volume since the number of moles of acid is equal in both cases

(b) It is less dense and does not burn like hydrogen.

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26. (a) They are both metals and need to lose electrons to be stable.

  (b) $RCO_{3(s)} \longrightarrow RO_{(s)} + CO_{2(g)}$
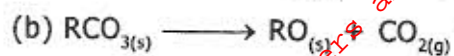
  (c) Q^3

27.

28. (a) $Ag_{(aq)} + e \, Ag_{(s)}$

  (b) $Ce = 1t = 5.0 \times 3 \times 60 \times 60 = 54000C$
  Mass of silver deposited

  $$= \frac{108 \times 54000}{96500}$$
  $$= 60.44g$$

29. (a) Metallic bonding

  (b) Group 1. Each atom contains one electron in its outer most energy level.

30. The molecules which were in form of a ring open up to give chained molecules (S_8). This entangles each other reducing the flow of molten sulphur in increasing its viscosity.