SMARTPASS EXAMINATION
233/1 CHEMISTRY MARKING SCHEME

1. a) (i) K ½ mk

(ii) J ½ mk

b) NH_4^+ Proton donor 2 mks

2a)X - Fractionating column 1/2mk
Y - Liebig condenser 1/2mk
b) to condense back the component of higher boiling point 1/2mk
c) shown on the diagram fractional distillation 1mk

3 - Pass the gases through lime water separately 1mk
- Carbon (iv) Oxide form white ppt
- carbon (ii) oxide won't form white ppt

4. Moles of acide = $\frac{18 \times 0.22}{1000}$
Moles of carbon $\frac{½ \times 18 \times 0.22}{1000}$)
Concentration of carbon = $\frac{18 \times 0.22}{2000} \times \frac{1000}{25}$
0.0792 3mks

5. a)-Bubbles of a gas at the a node
-Brown deposits at the cathode
-Blue colour of solution fade 2mk

b) 1 or 2 1mk

6.
(i) It turns red litmus paper blue and has no effect on blue litmus papers 1mk
(ii) Magnesium nitride 1mk
(iii) $Mg_3N_{2(s)} + 6H_2O_{11} \rightarrow 3Mg(OH)_{2(s)} + 2NH_{2(gs}$ 1mk

7. a) J. conducts electricity in both solid and liquid state 1 ½
b) Giant covalent structure
- doesn't conduct electricity and has high M.P and B.P 1 ½

8. a) Soapless detergent 1mk
   b) May not undergo biological degradation 1mk

9. Smoky ✓1 Accept sooty
   - Not hot enough ✓1

10. NO_3^- x - ($^-2$ x 3) = $^-1$
    x -6 = $^-1$
    x = $^-1$ + 6 ✓1
    x = + 5

    NH_3 x + (1x3) = 0 ✓1
    x + 3 = 0
    x = -3

3mks

11. 1 mole of CO_2 = 44g
    44g of CO_2 → 12 g of C
    1.32g " → $\frac{12 \times 1.32}{44}$ = 0.36 of C ✓ ½

    1 mole of H_2O = 18g
    18g of H_2O → 2g of H
    0.54g $\frac{2 \times 0.54}{18}$ = 0.06g of H ✓ ½

Element	C	H
Mass	0.36	0.06
Ram	12	1
Moles	$\frac{0.36}{12}$ = 0.03	$\frac{0.06}{1}$ = 0.06✓ ½
S.M.R	= $\frac{0.03}{0.03}$ = 1	$\frac{0.06}{0.03}$ 2 ✓ ½
	E.F = CH_2	

12. i) -Propanoic acid ✔ 1
    -ethanol ✔ 1
    ii) Potassium ethoxide ✔ ½
    Hydrogen gas ½

13. a) x= 233 – 4 = 229 ✓ ½
    y = 91 – 2 = 89✓ ½

b) **Nuclear reaction**	**Chemical reaction**
- Not affected by environmental / external factors. - Release large amounts of heat energy - Involves p+ n(in the nucleus)	- Affected by external factors - Heat energy released is much less - Involve electrons

Any 2
½ mk each

14. React $PbCO_3$ with HNO_3; ✓ ½ $Pb(NO_3)_{2(aq)}$ ✓ ½ is formed.
React $Pb(NO_3)_2$ with a soluble ✓ ½ chloride or dilute HCl; $PbCl_2$ ✓ ½ + a soluble NO_3^- are formed.
Filter; ✓ ½ $PbCl_{2\,(s)}$ collected as a Residue; dry between ✓ ½ filter papers or in the oven.

15. a) Heat change / or heat evolved when 1 mole ✓ 1 of is completely burnt is oxygen.

b) $4C_{(s)} + 5H_2$ ◺ $H+ (C_4H_{10})$ $C_4H_{10(g)}$

(-286 x 5) ✓1 -2877
$+4O_2$ $+ 2\frac{1}{2} O_2$ $+ 6\frac{1}{2} O_2$

(-393 x 4)

$4CO_{2\,(g)} + 5H_2O_{(l)}$

◺ $H_{+(C4H10)}$ + - 2877 = 4 x (-393) + 5 x (-286) ✓ ½

◺ $H_{+(C4H10)}$ = 2877 – 1572 – 1430

= 2877 – 3002
= -125kJ / mol ✓ ½

Or any other suitable method

16. Methyl / benzene is a non-polar ✓1 / molecular / covalent compound so HCl(g) will not ionize ✓1 in it.

17. i) metals ✓ ½; atomic radius is higher than ionic radius ½ mk
ii) C✓1 It has the least I.E 1 ∴electron lost easily / largest atomic radii ;- the outermost e- is far from the nucleus; feels less force of attraction and is easily lost ✓1

18. a) A black precipate is formed ✓1

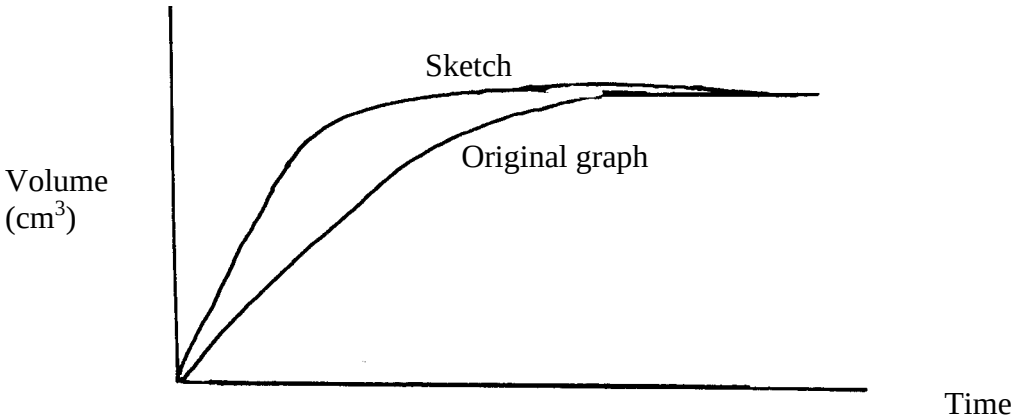
b) $Pb^{2+}_{(aq)}$ $S^{2-}_{(aq)}$ ⟶ $Pbs_{(s)}$ ✓1

19. Zn has a higher tending to release e- ; will protect Fe✓1
Fe has a higher tendency to release electrons to Sn; will rust✓1

20. Yellow/ brown colour of bromine water✓$^1/_2$ fades or becomes colourless because sodium hydroxide solution provides OH^-✓$^1/_2$ ions which reacts with H^+ ions to form water✓$^1/_2$, shift the equilibrium✓$^1/_2$ to the right.

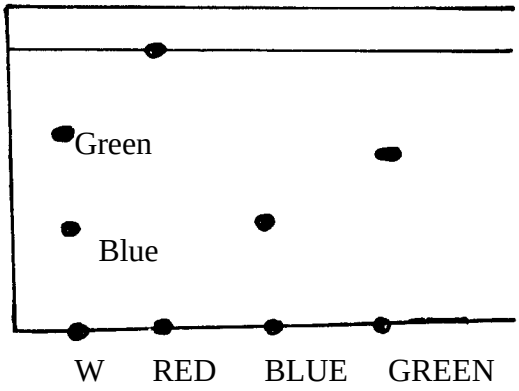
21. a) -Increase the concentration of Acid. ✓1
-Reduce the size✓of the ribbon (crush into powder I i.e provide a larger SA.
Any two (Use of powdered Mg)
-Increase Temp.

b)



22. i) Chromatography is a process by which separates a mixture of solutes by their different rates of movement in a porous material caused by a moving solvent.

ii) In line with blue and green



iii) Red – less sticky
- More soluble✓1
-Lighter / Low density

23. Q = It
I = 0.5
t = 32 x 60 +10
= 1930s✓1
Q = 0.5 x 1930
= 965C✓1
0.44g ⟶ 965
88 ⟶ x

$$x = \frac{965 \ x \ 88}{0.44} = 193000C \ \checkmark 1$$

$$\text{Faraday} = \frac{193000}{96500}$$

= 2F
∴ The change = +2✓1

24. Add Sodium Carbonate to both (1mk)

Effervescence in the case of ethanoic acid but not ethanol (1mk)

or

Add litmus solution / universal indicator (1mk)

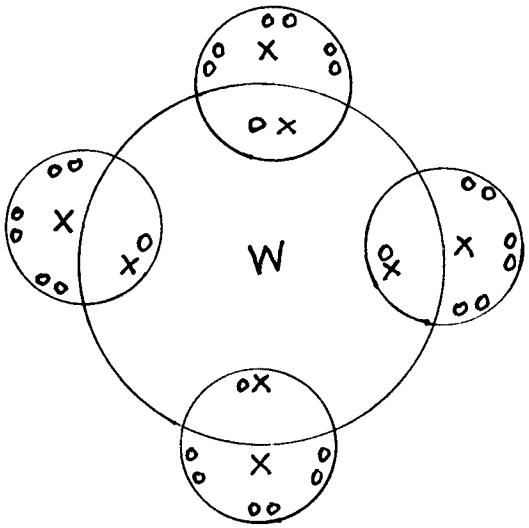
It turns red/acidic PH of 4.5 in ethanoic acid but not affected by ethanol (1mk)

Or

Warm each with ethanol after acidifying with dilute Sulphuric acid (1mk)

A sweet /pleasant smelling product formed in the case of ethanoic acid but not with ethano

25. Labelling ✓ (1)
Electron distribution ✓ (1)

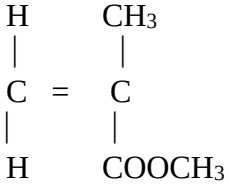


26 a) i) Dehydration ✓ ½
ii) To eliminate CO_2 ✓ ½

b) $PbO_{(s)} + CO_{(g)} \longrightarrow Pb_{(s)} + CO_{2(g)}$

c) - Water gas – A fuel ✓ ½
- Reducing agent in the extraction ✓ ½ of metals

27. a)



1mk

b) Perspex – used as a cheap glass substitute in optical components, display signs,transparent windows. Lighting fittings. 1mk

c) Advantages (perpex) Any one=1mk
-Light hence Portable
-Soft & malleable
-Good insulators
-Resistant to corrosion
-Cheap and affordable

28. Nitric acid is a strong oxidizing agent✓ and will oxidize the hydrogen formed into water✓.

29. i) T = 2.8.3✓1
U = 2.6✓1

ii) T_2S_3✓1

30. Burning magnesium produces a very strong heat which breaks✓$^1/_2$ carbon (IV) oxide into oxygen gas✓1 and carbon, then it continues✓$^1/_2$ to burn in oxygen to form magnesium oxide, but the heat produced by a burning splint is not strong enough to dissociate/ break ✓1carbon (IV) oxide into oxygen gas and carbon therefore goes off.

31. $\frac{P_1V_1}{T} = \frac{P_2V_2}{T_2}$

$T_1 = 295K$ $T_2 = 273K$✓$^1/_2$
$P_1 = 740$ $P_2 = 760$
$V_1 = 140$ $V_2 = ?$

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

$$\frac{740 \ x \ 140}{295} = \frac{760 \ x \ V_2}{273} \checkmark$$

$$V_2 = \frac{740 \ x \ 140 \ x \ 273}{760 \ x \ 295} \ \checkmark^1/_2$$

$= 126.15cm^3$