

231/2 CHEMISTRY (2017)
PAPER 2

MARKING SCHEME

1.

a) a white precipitate is formed (1mk)
 CO_2 reacts with $\text{Ca(OH)}_{2(\text{aq})}$ to form insoluble $\text{CaCO}_{3(\text{s})}$ (1mk)

b) The white ppt dissolves to form a colourless solution (1mk)
 $\text{CaCO}_{3(\text{s})}$ is converted to $\text{Ca(HCO}_3)_2(\text{aq})$ which is soluble
 $\text{CaCO}_{3(\text{s})} + \text{CO}_{2(\text{g})} + \text{H}_2\text{O (l)} \longrightarrow \text{Ca (HCO}_3)_2(\text{aq})$ (1mk)

c) Hissing sound.
 Effervesence/Bubbles of colourless gas are seen. (3mks)
 Sodium darts on Surface.

d) To suck gas produced.(1mk)

e) In graphite 3 out of 4 electrons are used in bonding. One electron is delocalized hence it conducts electricity .(1mk)
 In diamond all the 4 electrons are used in bonding hence no delocalized electrons.(1mk)

f) - Fire extinguishers.
 - Refrigerant. (2mks)
 - Fizzy drinks.

2.

a) T- 2.8.7(1mk)
 U-2.8.8.1(1mk)

b) because of the presence of allotropes(1mk)

c) i) T-(1mk)
 ii) U - (1mk)

Explanation because it has four energy levels.(1mk)

d) i) R form ions by gaining electrons. The incoming electrons cause electron repulsion that makes the energy level to bulge out increasing the size (1mk)
 ii) The nuclear charge increases from L to R hence an increase in nuclear attraction which pulls the energy levels to the nucleus. (1mk)

e) L - 2.1
 M - 2.7

f) U-19-2.8.8.1
 $2\text{U}_{(\text{s})} + 2\text{H}_2\text{O}_{(\text{l})} \longrightarrow$

g) Add water ✓ ½ to the mixture.
 Filter ✓ ½ the mixture to remove PbSO_4 as residue.
 Wash ✓ ½ the residue with distilled water.
 Dry ✓ ½ between two filter papers.

3.

a) Used a beaker in strong heating.(1mk)
No heat.(1mk)

b) Bulb lights. (1mk)
Cathode - purple vapor.(1mk)
Anode – Grey beads.(1mk)

c) Ions.(1mk)

d) Cathode $2\text{I}^-_{(l)} \rightarrow \text{I}_{2(g)} + 2\text{e}^-$ (1mk)
Anode $\text{Pb}^{2+}_{(l)} + 2\text{e}^- \rightarrow \text{Pb}_{(s)}$ (1mk)

e) from the positive terminal to the negative terminal of the battery(arrow on the wire).

f) -Extraction of reactive metals or extraction of metals e.g. Na, Al, Mg.
-Electroplating.
-Purifying metals.
-Manufacture of NaOH and chlorine. (any two 2mks)

4.

a) The volume of a fixed mass of a gas is inversely proportional to its pressure at constant temperature. (1mk)

b) (i)

Pressure	1	4	8	16	20	160
Volume	140	40	20	10	8	1
1/v	0.006	0.025	0.05	0.1	0.125	1.000

(3mks)

ii) axes- ½mk, scale- ½mk, line-1mk, plotting-1mk

c) Reading from the graph (student graph)(1mk)
-evaluation on the reciprocal of volume.(1mk)

5.

a) X – Hydrochloric Acid X is a strong Acid(1mk)
Y – Methanoic Acid is a weak acid.(1mk)

b) End of the reaction.(1mk)

c) a curve above X on the graph marked W and end point at Z.(2mks)

d) $\text{Mg}_{(s)} + 2\text{H}^+_{(aq)} \rightarrow \text{Mg}^{2+}_{(aq)} + \text{H}_{2(g)}$ (1mk)
e) Mole ratio 1:1

Moles of $\text{Mg}_{(s)} = \frac{1.2}{24} = 0.05$ moles

Mole of $\text{H}_2 = 0.05$ moles

Mass of $\text{H}_2 = 0.05 \times 2$
= 0.05g(2mks)

f) moles of $\text{H}_2 = 0.05$

volume of $\text{H}_2 = 0.05 \times 24$

= 1.2 litres or 1200 cm^3 (3mks)

6.

I

a) Yellow solid melts into amber liquid.(2mks)

b) $\text{H}_2(\text{g}) + \text{S}(\text{s}) \rightarrow \text{H}_2\text{S}(\text{g})$ (1mk) Penalise ½ for wrong state symbol / penalize fully for unbalanced eqn.

II

a) (i) K – Hydrogen sulphide 1 reject H_2S (1mk)M – sulphur (IV) oxide 1 reject SO_2 (1mk)

ii) Step I -Blue flames ½ misty fumes ½ choking smell.(1mk)

Step II-a vigorous reaction that produces white fumes.(1mk)

iii)-Temp of 450°C . (1mk)

-Pressure of 2 to 3 atmosphere.(½mk)

- V_2O_5 finely divided platinum or silica(½mk)b) $\text{Ca}(\text{OH})_2(\text{aq}) + \text{SO}_2(\text{g}) \rightarrow \text{CaSO}_3(\text{s}) + \text{H}_2\text{O}(\text{l})$ (2mks)

c) It makes the rubber tougher, less flexible, and less soft by reducing ✓ number of double bonds.(2mks)

7.

(a) (i) alkenes.(1mk)

(ii) Unsaturated hydrocarbons.(1mk)

(iii) $\text{C}_2\text{H}_4/\text{C}_3\text{H}_6/\text{C}_4\text{H}_8$, its boiling point is below room temperature.(2mks)(iv) C_8H_{16} (1mk)

(V)Boiling point increases with increase in relative molecular mass, due to increase in intermolecular forces.(1mk)

(b)(i) X- $\text{C}_2\text{H}_5\text{OH}$.(1mk)

Y-dehydration.(1mk)

Z- $\text{C}_2\text{H}_5\text{C.l}$ (1mk)

(ii) substitution reaction.(1mk)

(iii) Presence of sunlight/UV light.(1mk)