WAKISSHA JOINT MOCK EXAMINATIONS 2015
UGANDA ADVANCED CERTIFICATE OF EDUCATION
MARKING GUIDE
P525/1
CHEMISTRYPRACTICAL
PAPER 1
JULY/AUGUST 2015

1(a) (i) Hydroxy*l* group. $^1/_2$

(ii) $C_4H_{10}O + Na \rightarrow C_4H_9\bar{O}Na^+ + \frac{1}{2}H_2$

OR $C_4H_9OH + Na \rightarrow C_4H_9ONa + \frac{1}{2}H_2$

(b) (ii) $X\text{-}CH_3\,C\text{-}\,CH_3$ Or $(CH_3)_3\,C\text{-}OH$ or $CH_3\,C\,(OH)\,CH_3$

Accept X – 2-methyl propan -2-Ol.

(ii) $CH_3\,C(OH)\,CH_3 \xrightarrow[\text{Heat}]{\text{Conc.}H_2SO_4} CH_3\,C = CH_2 + H_2O$ Ignore b(ii) if b(i) incorrect

$(CH_3)3C - OHH - OSO3H$

(iii) Unimolecular or molecularity = 1

The rate determining step (slowest step) involves only one chemical species the protonated alkanol.

2(a) (i) $Cu^+\text{-}1S^22S_22p^63S^23p^63d^{10}$

(ii) $Cu^+\text{-}1S^22S_22p^63S^23p^63d^9$

(b)(i) $2Cu^+_{(aq)} \rightarrow Cu_{(s)} + Cu^{2+}_{(aq)}$

2(-602) 795

↘ 2Cu(s)↙

DHd = 2(-602) + 795.

= -409KJmol^{-1}

Or $2Cu^+_{(aq)} + 2e^- \rightarrow 2Cu(s)$ DH = 2(-602)

$Cu(s) \rightarrow Cu^{2+}_{(aq)} + 2e\text{-}$, DH = 795

2Cu+ (aq) → Cu(s) + CU2+ (aq), DHd = 2(-602) +795

= -409KJmol^{-1}

(ii) Copper (11) ions are more stable than copper (1) ions.
The enthalpy of disproportionation is negative or disproportionation of copper (1) ions to copper and copper (11) ions is exothermic.

(c) Copper forms coloured compounds in aqueous solution of hydrated salts.

Formation of complexes e.g. $(Cu(NH_3)_4)^{2+}$. Copper and some of its compounds act as catalyst.

3(a) X- $\frac{226}{89}$ Ac

Y- $\frac{222}{87}$Fr

Z-$\frac{218}{85}$

(b) $\lambda = \frac{In2}{t\frac{1}{2}}$ or $\frac{0.693}{t\frac{1}{2}} = \lambda$

$= \frac{In2}{1600} = 4.33216X10^{-4}$ per year.

$Nt = Noe^{-\lambda t}$

$= 0.02x6.02x10^{23}e^{-4.33216x10-4}x2.40x10^{4}$

$= 3.67432x10^{17}$atoms.

Accept $2.303\log(\frac{Nt}{No}) = -\lambda t$

$2.303\log(\frac{Nt}{0.02}) = -4.33216x10^{-4}x2.4x10^{4}$

$Nt = 6.11x10^{-7}$moles.

No of atoms $= 6.11x10^{-7}x6.02x10^{23}$

$= 3.68x10^{17}$atoms.

(c) Radioactivity carbon -14 in carbon dating (to determine age of dead plant of animal tissue)

- Treatment of cancer by gamma rays.

4(a) Iron (III) chloride solution and heat (boil).

$CH3CO\bar{O}NH4$ – Brown precipitate.

$NH_4F_{(aq)}$ – No observable change.

(b) Sodium nitrite and concentrated hydrochloric acid below 10^0C or 0-5^0C

$CH_3CHCH_2NH_2$ – Effervescence of a colourless gas neutral to litmus.

|

OH

(C) NiO and FeO.

Reagent(s) – dilute nitric acid followed by potassium hexacyanoferrate (III) solution.

NiO – No observable change on addition of potassium hexacyanoferrate (III) solution.

FeO dark blue precipitate.

Accept – dilute mineral acid (HCl, HNO3 H2SO4) followed by dimethyl glyoxime/ excess sodium hydroxide solution.

5(a) (i) $2I^-_{(aq)} \rightarrow I_{2\,(aq)} + 2e^-$

(ii) $E^{\Theta}_{cell} = E^{\Theta}_R - E^{\Theta}_L$. or $E^{\Theta}_{cell} = E^{\Theta}_{Right} - E^{\Theta}_{Left.}$

$0.23 = 0.77 - E^{\Theta}_2$.

$E^{\Theta}_2 = 0.77 - 0.23 = +0.54V$.

Accept $E^{\Theta}_{cell} = E^{\Theta}_{cathode} - E^{\Theta}_{anode.}$

$E^{\Theta}_2 = 0.77-0.23$

$= +0.54V$.

(C) Temperature of 298k or 25^0C.

Pressure of 1 atom or 760mmHg.

6(a) (i) Dilead (II) lead (IV) oxide.

(ii) $FeO_{4(s)} + 8H^+_{(aq)} \rightarrow +Fe^{2+}_{(aq)}\ 2Fe^{3+}_{(aq)} + 4H_2O_{(i)}$

Accept any dilute mineral acid.

(b)(i) Chlorine or Cl_2

Lead (11) chloride or $PbCl_2$

(ii) $Pb_3O_{4(s)} + 8HCL_{(aq)} \rightarrow 3PbCL_2\ (aq) + CL_2\ (g) + 4H_2O_{(I).}$

(c) Iron and lead are oxidise by concentrated sulphuric acid to sulphates reducing the acid to sulphur dioxide and water.

Heated metals directly react with chlorine gas to form chlorides.

7(a) K_2CO_3 or potassium carbonate.

K_2CO_3 has the lowest dissociation pressure hence it does not readily decompose at 100^0C to liberate carbon dioxide.

(b)(i) Li_2CO_3. Or Lithium carbonate.

(ii) $Li_2CO_3 \rightarrow Li_2O_{(s)} + CO_{2\ (g)}$

The lithium ions has the smallest ionic radius hence high charge density. The lithium Cation (Li^+) polarizes the carbonate ion reducing the magnitude of electrostatic force between Lithium ions and carbonate ions. The lattice of Lithium carbonate is unstable thus dissociates more readily to liberate carbon dioxide gas which exerts pressure in the equilibrium mixture.

(c) Forms only the normal oxide unlike other group 1 element which form peroxides or super oxides.

Lithium nitrate decomposes to form lithium oxide, nitrogen dioxide and oxygen gas but other nitrates decompose to form a nitrite and oxygen.

Lithium reacts with nitrogen to form lithium nitride other elements don't form nitrides.

8(a) (i) Q – Ethanoyl chloride.

(ii) W- Benzene

(b) (i) PCL5 or PCL3 or SOCL2 and Heat.

(ii) Zinc at _____ ^0C or heat/distil.

(c) (i) Electrophilic substitution.

(ii) W- or benzene has delocalized pi electrons which attack the electrode deficient carbon atom of Qin the presence of $ALCL_3$ (halogen carrier) replacing the hydrogen atom of benzene.

$ALCL_4^- + H^+ \rightarrow ALCL_3 + HCL$

(d)(i) Sweet fruity smelling compound.

9(b) (i) Azeotropic mixture or 95.6% ethanol and 4.4% water.

(ii) Pure water.

(c) (i) The intermolecular forces weaken or the magnitude of intermolecular force reduces / decreases.

(ii) The vapour pressure above solution is higher or increases relative to that of ideal solutions.

SECTION B

10(a) (i) $RCH_2I + NaOH_{(aq)} \rightarrow RCH_2OH + NaI_{(aq)}$

Or $RCH_2I + \bar{O}H_{(aq)} \rightarrow RCH_2OH + I^-_{(aq)}$

$AgNO_{3\ (aq)} + NaI_{(aq)} \rightarrow AgI_{(s)} + NaNO_{3\ (aq)}$

Or $Ag^{+}_{(aq)} + I^-(aq) \rightarrow AgI(s)$