

K.E

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Aceteka Guide O-level p₂K.ECondensed Guide

UCE 2019

CHEMISTRY

545/2

U.C.E

Marking guide

1. (a) (i) Difference in solubility of the components in a solvent that moves in a stationary medium. phase ✓ solute 1mk

(ii) Difference in solubility of the salts in a solvent at a given temperature ✓ 1mk

(b) (i) A uniform mixture formed ✓

Ethanol and water are miscible

(ii) Two separate layers with a liquid junction between them. ✓

Oil and water are immiscible.

(c) (i) Water

(ii) Water is denser than kerosene

— water is more dense

then kerosene

(a) Concentrated sulphuric acid

(b) (i) $\text{H}_2\text{SO}_4(l) + \text{NaCl}(s) \rightarrow \text{NaHSO}_4(s) + \text{HCl}(g)$

(ii) $2\text{HCl}(aq) + \text{Fe}(s) \rightarrow \text{FeCl}_2(aq) + \text{H}_2(g)$

(c) (i) $\text{HCl}(g) + \text{Ag}^+(aq) \rightarrow \text{AgCl}(s) + \text{H}^+(aq)$

(ii) Confirmatory test for chloride ion in solution

— accept test for Cl^-

— accept; test for presence of Cl^-

3. (a) SO_4^{2-} and $\text{SO}_3^{2-}(aq)$

Acidified barium nitrate

adding solutions

— Accept BaCl_2 and

SO_4^{2-} - white ppt insoluble in acid

Res. ppt.

SO_3^{2-} Bubbles of a colourless gas and colourless solution

— accept white ppt soluble.

(b) Al^{3+} and $\text{Pb}^{2+}(aq)$

Potassium iodide solution ✓

Al^{3+} - No observable change Pb^{2+} - Yellow ppt

accept observation if learner has not specified
white barium remains in solution

— accept white soln

— dilute H_2SO_4

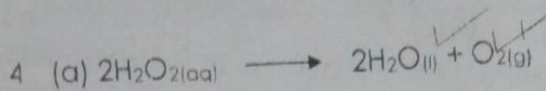
— Na_2CO_3

(c) I⁻ and Cl⁻ (aq)

Silver nitrate solution
in dilute nitric acid ✓

I⁻ - Yellow precipitate
Cl⁻ - white ppt
insoluble in acid. ✓

6

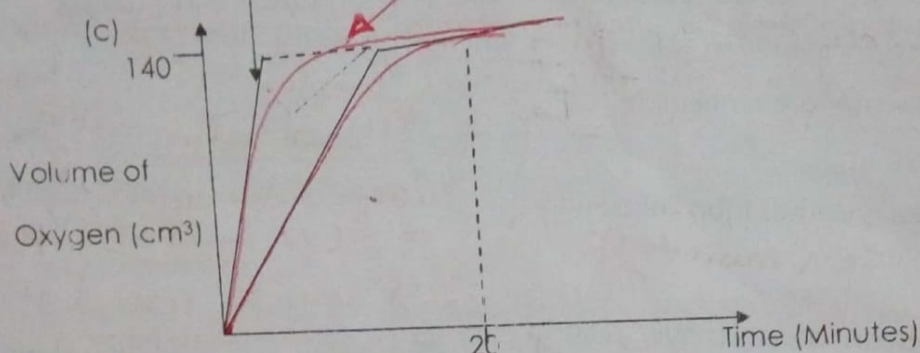


$1\frac{1}{2}$ mks

(b) Manganese (IV) oxide ✓ *accept manganese dioxide*

$\frac{1}{2}$ mk

Decomposition in presence of MnO₂.



1 mk

(d) Rate = $\frac{\text{Volume cm}^3}{\text{Time taken minutes}}$

$= \frac{140}{20}$

1 mk

*- Res w per
- Res w ber (1)*

$= 7 \text{ cm}^3 \text{ per minute}$ *$7 \text{ cm}^3 \text{ min}^{-1}$*

(e) (i) Zero ✓ ; *$0 \text{ cm}^3 \text{ min}^{-1}$*

$\frac{1}{2}$ mk

(ii) Reaction came to completion at 20 minutes

$\frac{1}{2}$ mk

5

5. (a) Atomic number is the number of protons in the nucleus of an atom. ✓

1 mk

Atomic mass is the sum of protons and neutrons in the nucleus of an atom. ✓

(b) (i) The atoms have different number of neutrons in their nuclei. ✓

1 mk

(ii) Isotopes ✓ *(1)*

$\frac{1}{2}$ mk

(c) An atom has equal numbers of electrons and protons.

Electrons are negatively charged while protons are positively charged.

Their equality ensures that the atom is neutral.

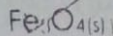
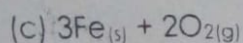
2 mks

6 (a) (i) Reddish - brown

(ii) Hydrated iron (III) oxide

(b) (i) Galvanized iron is one coated with zinc.

(ii) It prevents iron from rusting which makes iron weak and soft.



$4\frac{1}{2}$ mks

$\frac{1}{2}$

1 mk

1 mk

1 mk

$1\frac{1}{2}$ mk

5

7 (a) Mass of oxygen in W = 7.17

$$\begin{array}{r} 7.17 \\ -6.21 \\ \hline 0.96 \end{array}$$

$$\begin{aligned} \text{\% of oxygen} &= \frac{0.96}{7.17} \times 100 \\ &= 13.389\% \end{aligned}$$

2 mks

$$\begin{aligned} \text{\% of Pb} &= 100 - 13.389 \\ &= 86.611\% \end{aligned}$$

(b) Elements
Mass

Pb
6.21

O
0.96

Number of moles

$$\frac{6.21}{207}$$

$$= 0.03$$

$$\frac{0.96}{16}$$

$$= 0.06$$

Ratio of moles

$$\frac{0.03}{0.03}$$

$$1$$

$$\frac{0.06}{0.03}$$

$$2$$

Empirical formula in PbO_2

$$(\text{PbO}_2)_n = 239$$

$$207n + (16 \times 2)n = 239$$

$$239n = 239$$

$$n = 1$$

formula of W is PbO_2

(c) Lead (IV) oxide

Accept lead dioxide

$2\frac{1}{2}$ mks

$\frac{1}{2}$ mk

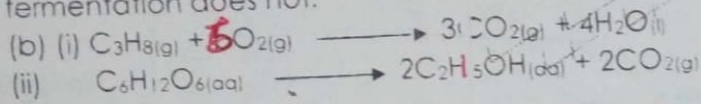
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8. (a) (i) Carbon monoxide

3

- (ii) Copper $\xrightarrow{\quad}$ $2\text{CO}_{(g)}$ - red want states' - red (g) is wrong states 1mk
- (b) (i) $\text{CO}_{2(g)} + \text{C}_{(s)} \xrightarrow{\quad}$ $\text{CU}_{(s)} + \text{CO}_{2(g)}$ 1mk
- (ii) $\text{CO}_{(g)} + \text{CuO}_{(s)} \xrightarrow{\quad}$ $\text{CU}_{(s)} + \text{CO}_{2(g)}$ - red (s) is wrong states $\frac{1}{2}$ mk
- (c) (i) Calcium hydroxide solution accept lime water. $\frac{1}{2}$ mk
- (ii) Carbon dioxide turns calcium hydroxide solution from colourless to cloudy. white precipitate (milky solution) 1mk
- Carbon monoxide produces no observable change.

- (a) (i) It is a chemical breakdown of a sugar by bacteria, yeast, or microorganism to produce carbon dioxide, heat and ethanol.
- (ii) Combustion requires oxygen in order to take place whereas fermentation does not.



- substance that react w base to produce salt and water alkali.

10. (a) Acid is a compound or substance which when dissolved in water produces hydrogen ions as the only positively charged ions in solution. 1mk

- accept proton donor. then nitric acid 1mk

(b) Less volatile acid (or stronger acid) than nitric acid.

- (c) (i) Freshly prepared iron(II) sulphate solution and concentrated sulphuric acid. 1mk

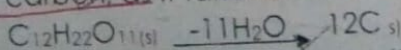
(ii) Brown ring ✓ $\frac{1}{2}$ mk

SECTION B

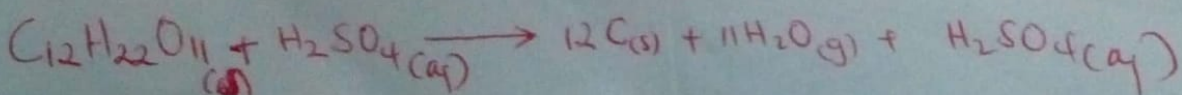
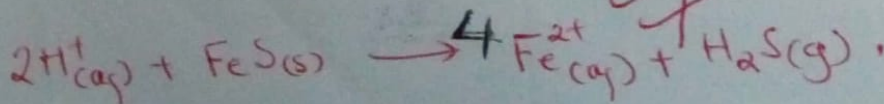
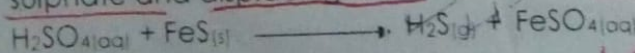
11. (a) Three concentric pipes are sunk into the ground up to the sulphur beds/deposits. Super heated water at 170°C and under pressure is sent down to the sulphur through the outer most pipe. This is to melt the sulphur. Hot compressed air is forced down the pump through the inner most / smallest pipe.

This forces out the mixture of molten sulphur and water through the middle pipe. molten sulphur is collected into tanks, where it solidifies into yellow nod 7mks

- (b) (i) Concentrated sulphuric acid dehydrates sugar / sucrose forming carbon as it takes elements of water. discuss it is hygroscopic oxidizing it to 7mks

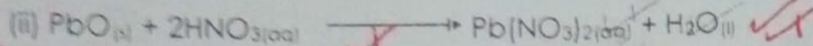


- (ii) Iron (III) sulphide reacts with dilute sulphuric acid to form iron (II) sulphate and displacing the more volatile hydrogen sulphide. ✓ 7mks



(c) Hydrogen sulphide is poisonous
Hydrogen sulphide has a bad smell of rotten egg.

12 (a) (i) Yellow solid dissolved to form a colourless solution.



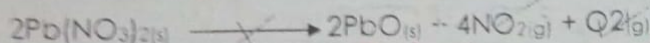
(iii) Filter off excess lead (II) oxide from the reaction mixture.

Heat the filtrate to saturation point.

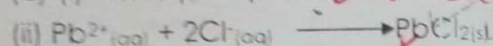
Allow it to cool so that crystals can form.

Filter off the crystals, wash them with a little cold distilled water and dry them between filter paper.

(b) White crystals produce crackling sound, melt and produce brown gas/fumes and residue that is reddish brown when hot and yellow on cooling.



(c) (i) White precipitate

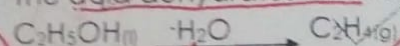


(d) (i) White precipitate dissolved to form a colourless solution and recrystallized as needle like crystals on cooling.

(ii) Lead (II) chloride is soluble on heating.

13. (a) (i) A mixture of ethanol and excess concentrated sulphuric acid to a temperature of 170 - 180°C.

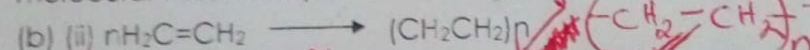
The acid dehydrates ethanol to form ethene.



(ii) Bromine water.

Red liquid would turn colourless.

(b) (i) A polymer is a single molecule of large molecular mass formed by a combination of very many molecules, often in thousands, of a simple low molecular mass compound known as a monomer.



Ethene is the monomer and the product is polyethene.

(c) (i) Polyethene is synthetic since it is man-made.

It is a thermoplastic because when heated it becomes soft and on cooling hardens and hence can be remoulded into other shapes by heating.

Polyethene is non-biodegradable because it is not decomposed by bacteria.

(ii) It pollutes soil (or water bodies).

1 1/2 mks

1 1/2 mks

4 mks

4 mks

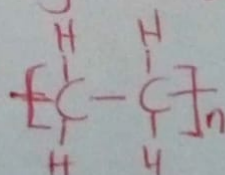
1 mk

1 mk

4 mks

2 1/2 mks

3 mks



— Decomposition of an electrolyte when electricity is passed through it.

14. (a) A process by which a compound in molten state or aqueous state conducts electricity and as a result it is decomposed by it at the electrodes.

(b) (i) Graphite (or carbon)

(ii) Sodium chloride

(c) Both sodium ion and hydrogen ion migrate to the mercury cathode.

Sodium ion because of nature of the cathode is discharged by electron gain to form sodium atoms. These dissolve in mercury cathode and follow into lower cell where it's made to drop in water. A reaction with water produces hydrogen and sodium hydroxide which is dried. to form crystals

(d) (i) Simsim oil (OR EQUIVALENT)

(ii) A mixture of sim sim oil and concentrated sodium hydroxide is heated and allowed to boil while stirring continuously, until frothing stops.

A saturated solution of sodium chloride is then added to precipitate the soap.

(e) (i) Ammonia

(ii) Sodium hydroxide is a stronger base than ammonia.

(iii) Concentrated hydrochloric acid dense white fumes.

Res other options like Litmus.

1mk

$\frac{1}{2}$ mk

$\frac{1}{2}$ mk

$\frac{1}{2}$ mk

1mk

2mks

15

END

6

S.1.
S.3.
S.4.
S.5.
T.3.
T.4.
T.5.