NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2022

TECHNICAL SCIENCES: PAPER II

MARKING GUIDELINES

Time: 1½ hours 75 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

QUESTION 1

1.1 A

1.2 A

1.3 D

1.4 C

1.5 B

QUESTION 2

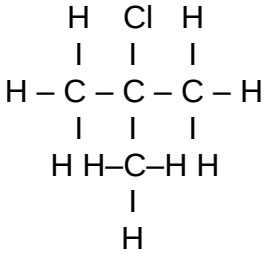
2.1 2.1.1 F

2.1.2 D

2.2 2.2.1 Propan-2-one **propane 2-one**

2.2.2 2,4-dimethylpentan-1-ol **2,4-dimethyl pentan -1-ol**

2.3

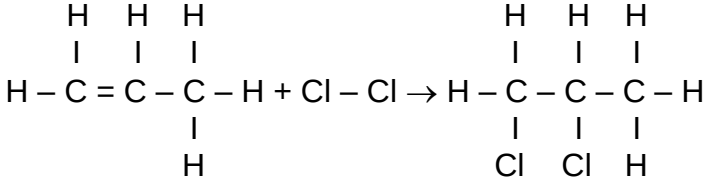


3 Carbon atoms
Cl on 2nd C
CH_3 on 2nd C atom

2.4 Ester

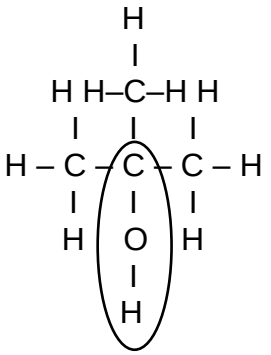
2.5 2.5.1 Addition reaction/Halogenation

2.5.2



QUESTION 3

3.1 3.1.1



3 C atoms in chain & $-CH_3$ on 2nd C atom

–OH on 2nd C atom

3.1.2 D

3.2 3.2.1 Hydrogen bromide (HBr)

3.2.2 Substitution / halogenation

3.3 3.3.1 What is the relationship between viscosity/flow time and chain length/number of C atoms/alcohols? **Both dependent and independent variables mentioned**

3.3.2 C (propan-1-ol)
Flows the slowest/longest flow time/most resistance to flow.

3.3.3 The intermolecular forces increase as the chain length or number of carbon atoms increase. Therefore, the resistance to flow/viscosity increases.

3.3.4 C or propan-1-ol

3.4 D or butan-2-ol

3.5 The straight chain alcohol has a longer chain length thus, bigger contact surface. Bigger surface area increases intermolecular (London) forces which increases the resistance to flow and therefore a better lubricant.

3.6 3.6.1 A plastic is a synthetic material derived from organic compounds.

3.6.2 Film wrap
Bread plastic bags
Shopping and dry-cleaning bags
Freezer bags
Squeeze bottles **Any one**

QUESTION 4

4.1 Electrolytic cell

4.2 Electrical to chemical energy.

4.3 P

4.4 Loss of electrons.

4.5 The medal is covered by a thin layer of copper.

4.6 $Cu^{2+}(aq) + 2e^{-} \rightarrow Cu(s)$

4.7 Reduction half reaction.

4.8 Decrease

4.9 The colour will become very light blue/colourless which indicates less Cu^{2+}ions/ decrease in the Cu^{2+} ion concentration.

4.10 Replace carbon electrode with a silver electrode.

OR

Use silver nitrate as an electrolyte.

QUESTION 5

5.1 Salt bridge

5.2 KNO_3/NH_4NO_3 Potassium nitrate/Ammonium nitrate
It will not form a precipitate with any ions/all nitrates are soluble in the half cells **or**
It is cheap and readily available.
It is an ionic compound, it will dissociate to form ions to maintain electrical neutrality in the salt bridge. Any one

5.3 Galvano meter/Voltmeter.

5.4 Copper

5.5 Pressure 101,3 Pa
Concentration 1mol.dm^{-3}
Temperature 25°C or 298K **Any one**

5.6 $Fe(s)/Fe^{2+}(aq)(1\ mol{\cdot}dm^{-3})\ //Cu^{2+}(aq)\ (1\ mol{\cdot}dm^{-3})/Cu(s)$

5.7 $E°_{cell} = E°_{reduction} – E°_{oxidation}$
$= +0,34 – (–0,44)$
$= 0,78\ V$

5.8 Yes, it will be spontaneous as the EMF of the cell has a positive value.

5.9 Biodiesel
Photovoltaic cell

QUESTION 6

6.1 A semi-conductor is a material that has electrical conductivity between that of a conductor and an insulator.

6.2 Doping

6.3 N-Type semi-conductor

6.4 A region which is completely depleted of charge carriers.

6.5 The depletion area will widen which makes it difficult for the charge carriers to cross p-n junction.

6.6 Forward-biased

Total: 75 marks