higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

PROCESS CHEMISTRY
NQF LEVEL 4

12 November 2024

This marking guideline consists of 6 pages.

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QUESTION 1

1.1 True
1.2 False
1.3 True
1.4 True
1.5 False

(5 × 1) **[5]**

QUESTION 2

2.1 2.1.1
- Lightweight
- Has high tensile strength
- Good resistance to chemicals
- Resistance to dirt
- Durable
- Melting point is 160 °C
- Tough but flexible
- Transparent (Any 2 × 1)

2.1.2 Used to make:
- Film wrap
- Plastic bags
- Containers
- Sandwich bags (Any 2 × 1)

(2 × 2) (4)

2.2 It is used in grocery shopping bays. (1)

2.3
- PVC has good corrosion resistance.✓
- It is a good electrical insulator.✓ (2)

2.4 Plastic recycling is a process through which scarps of plastic and other plastic waste are sorted from waste and melted in special ovens and converted into other valuable products.✓✓ (2)

2.5
- LDPE
- PP
- PVC
- PET
- HDPE (5)

[14]

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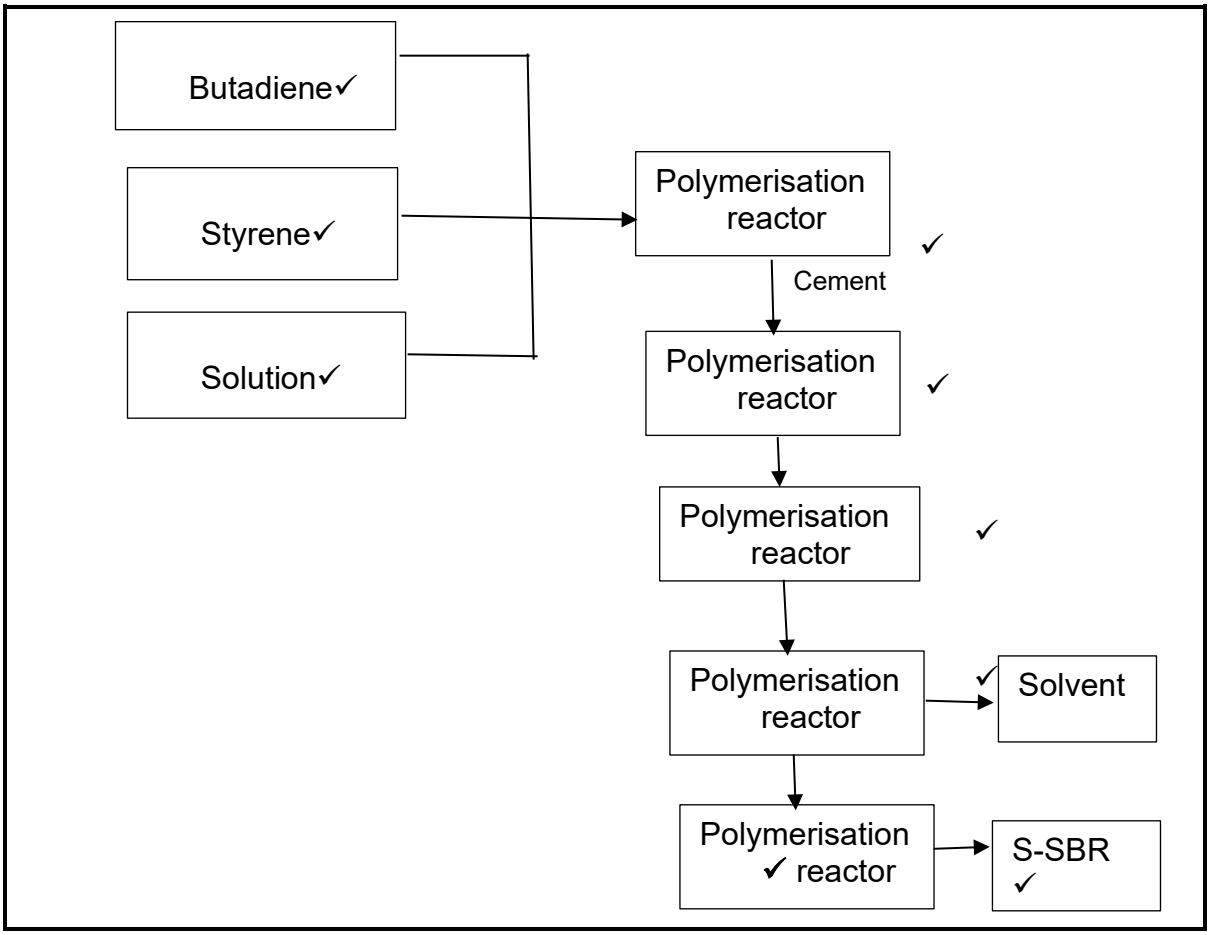
QUESTION 3

3.1



(10)

3.2 3.2.1 $NaC\ell(s) + H_2O(\ell) \rightarrow C\ell_2(g)\checkmark + H_2(g)\checkmark + 2NaOH(aq)\checkmark$ (3)

3.2.2 $C\ell_2(g) + CH_2 = CH_2 \rightarrow CH_2 = CHC\ell\checkmark + HC\ell\checkmark$ (2)

[15]

QUESTION 4

4.1
A – Dissolution
B – Solvent extraction
C – Solvent extraction
D – Dissolution
E – Neutralisation
F – Precipitation
G – Reductive precipitation
H – Scrubbing + stripping
I – Precipitation
J – Solvent extraction
K – Scrubbing + stripping
L – Solvent extraction
M – Stripping
N – Precipitation (14)

4.2 4.2.1 Gold is used:
- To make jewellery
- To make medals and badges
- In medicines and dentistry

(Or any other relevant application) (Any 2 × 1) (2)

4.2.2 Uses of silver:
- Electrical conductors and computer components
- In the production of mirrors
- In silver soldering and brazing
- In the production of solar panels
- For production of silver cutlery
- Jewellery (Or any other relevant application) (Any 2 × 1) (2)

4.3
- The solution that contains platinum, iridium and ruthenium undergoes a solvent extraction to recover platinum and iridium.
- The solvent used during the process is called tri-n-octylamine.
- The organic phase is stripped and precipitated with hydrochloric acid and ammonium chloride.
- The platinum that is produced during this process is 99,5% pure.
- The tri-n-octylamine is stripped with concentrated hydrochloric acid to recover iridium. (Any 3 × 1) (3)

4.4
- Charge chrome (ChCr) or high-carbon ferrochrome (HCFC)
- Medium-carbon ferrochrome (MCFC)
- Low-carbon ferrochrome (LCFC) (3)

[24]

QUESTION 5

5.1 5.1.1 NH_4NO_3
5.1.2 $C_{10}H_8$
5.1.3 $C_6H_5CH_3$

(3 × 1) (3)

5.2 5.2.1 South African Coal, Oil and Gas Corporation (1)

5.2.2
- Gasification
- Gas cleaning
- Fischer-Tropsch synthesis
- Product work-up (4)

5.2.3
- Solvents
- Polymers
- Fertilisers
- Explosives (Any 3 × 1) (3)

5.2.4 $3C(s)\checkmark + O_2(g)\checkmark + H_2O(g) \rightarrow H_2(g)\checkmark + 3CO(g)\checkmark$ (4)

[15]

QUESTION 6

6.1 6.1.1 Diesel (1)

6.1.2
- Petrol
- Paraffin and other chemicals (2)

6.2
- Prewash:✓ Medium cold ethanol is used to remove naphtha, benzene, hexanes and toluene.✓
- Main wash:✓ Prewashed gas is washed with very cold methanol to remove a high percentage of H_2S and CO_2.✓
- Fine wash:✓ Gas from the main wash is washed for the last time to further remove H_2S and CO_2. The resulting gas contains less than 0.1 ppm H_2S and 1.5% CO_2.✓ (3 × 2) (6)

6.3 6.3.1 Petrol
6.3.2 Diesel
6.3.3 Paraffin
6.3.4 Asphalt or tar
(4 × 1) (4)
[13]

QUESTION 7

7.1 Herbicides are substances that are used to eliminate, prevent or control the spread of unwanted plants.✓ (1)

7.2 Oxygen: Essential at the start, detrimental if introduced post-fermentation.□
Time: Vitally impacts flavor development and overall beer maturity.
(2 × 2) (4)

7.3
- High-quality alcohol
- Spirit vinegar
- Fusel oil
- Molasses solids (Any 2 × 1) (2)

7.4
- During the mashing process, starch stored within the grist is converted to sugar.✓
- Water heated to a temperature of 65 °C is added during the mashing process.✓
- The mash mixer is equipped with a paddle that mashes and agitates the mixture.✓
- The mash consists of wort (the soluble material) and other extracts. The mashing process takes about an hour to be complete after which the mash is sent to the lauter tun.✓ (4)

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7.5 It avoids killing or deactivating the yeast microorganisms.✓ (1)

7.6
- Hops add a bitter taste to beer. OR Hops add flavour to beer.
- Hops improve the foam qualities of beer. (2)

[14]

TOTAL: 100

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