

Item 1

a. Soapy detergent ✓^{ci}

ci - category identified

b. Soap contains two parts; the hydrophilic part / water loving part / polar end and the hydrophobic part / water hating / nonpolar end.

wo - washing

During washing the hydrophilic end is soluble in water and dissolves in it while the hydrophobic end is attracted to the dirt / oil / grease. This lowers the surface tension between the water and the dirt.

$$\frac{3 \text{ wo}}{1}$$

$$= \frac{3}{1} \times 8$$

$$= 6 \text{ wo}$$

On agitation / scrubbing the dirt is emulsified and carried away by the water. The dirt is then removed by rinsing.

Award F=1, for learner who has 6wo and above

$$T = C_i + F$$

$$= 1 + 1$$

$$= 2$$

c. Soap contains chemicals which can cause skin burns and hence cause pain or even result into cancer.

This can be mitigated by washing the body part in contact with soap using clean water.
(OR EQUIVALENT)

$$D = D_i + E + M$$

$$D = 3$$

d. Both soapy and soapless detergents are effective when washing using soft water but I advise this home to use soapless detergents because it does not form scum with hard water while soapy detergents form scum.

S - similarity

D_i - difference

$$F = S + D_i$$

$$F = 2$$

(OR EQUIVALENT)

Item 2

- a) Metal because it ^{loses electrons in outer} ~~most shell to form the~~ ^{metal ion / cation / positively charged ion} and the ~~delocalised electrons~~ e.g. aluminium

C_i - category

R - Reason

E - Example

$$C = C_i + R + E$$

$$C = 3$$

- b) Resistant to corrosion

Malleable

Ductile

High melting point

(OR EQUIVALENT)

b, and c, are combined / merged

$$HP + Lu \quad X = 3$$

- c) Making of utensils such as pans,
Making bicycle / aeroplane parts
(OR EQUIVALENT)

1-3p and 1u
or

3p and 0u

$$X = 2$$

2p and 0u or

1p and 0u or

0p and 1u

$$X = 1$$

- d) It is non biodegradable and when thrown
in the soil it reduces its aeration and
causing infertility
Mitigation

Collect the aluminium parts and recycle

No p or No u

$$X = 0$$

$$I = D_i + M$$

$$I = 2$$

Item 3

Raw materials $\checkmark$ + RMWastes e.g. animal dung $\checkmark$ - RMWater $\checkmark$ - RM

RM - raw materials

V - vessel

 P_i - Physical / chemical process

cd - conversion to desired product

ch - coherence

cp - complete process

 P_o = purification (if any)

$$C.P = 3P_i + P_r$$

 $P = 3$ if learner gives all RM and V, cp, cd, ch $P = 2$ if learner gives 1 RM and any three of V, cp, cd, ch $P = 1$, for 1 RM and any 1 of V, cp, cd, ch $P = 0$ for NO RM

NO, V, cp, cd, ch

$$S = D_i + E + M$$

$$S = 3$$

 $S = 2$ for $D_i + E$ or $D_i + M$ or $E + M$ only given $S = 1$ for D_i or E or M only given $S = 0$, if none is given

Process of production

Biogas is normally produced by anaerobic action $\checkmark$ P_i of microorganisms on the wastes producing gases such as ammonia, methane, carbon dioxide, hydrogen sulphide, nitrogenThe wastes are collected and mixed with a specific proportion of water in a bucket / container $\checkmark$ P_i The mixture is put into a tank or chamber where bacteria break down $\checkmark$ P_i the organic substances like carbohydrates, proteins and fats into sugars, amino acids and fatty acidsThe sugars, amino acids and fatty acids are then passed into an anaerobic chamber where microorganisms convert them into carbon dioxide $\checkmark$ P_i nitrogen, hydrogen sulphide, methane and ammonia. These gases make up biogas which is used for cooking and lighting

The residue bio slurry is used as fertilizer

Side effects

The gases may escape to the atmosphere and pollute the environment. For example carbon dioxide is a greenhouse gas which causes global warming $\checkmark$ (OR EQUIVALENT)

Mitigation:

constant inspection of $\checkmark$ M containers to check any holes in them. (OR EQUIVALENT)

Social benefit

People will get employment opportunities, hence increased income and improved standards of living.

(OR EQUIVALENT)

B_i

B_i = social

benefit

E = Effect of

benefit

I = impact of the benefit

$$B = B_i + E + I$$

$$B = 3$$

$$B = 2 \text{ for}$$

$B_i + E$ or $B_i + I$ or $E + I$ only given

$$B = 1$$

for B_i , I or E only given

$B = 0$ if no B_i , I or E given

Item 4

DATE: / /

Raw materials

Cassava ✓ RM

Water ✓ RM

Malt ✓ RM

Yeast ✓ RM

Process of production

Alcohol is prepared by fermentation process. ✓ P

Cassava is crushed and heated in steam under pressure to extract starch in drums starch is treated with malt (partially sprouted malt barley) for an hour at 60°C. Malt supplies an enzyme diastase which hydrolyses starch to sugar, maltose. ✓ P

Yeast is then added at room temperature and one of its enzymes, maltase catalyses the hydrolysis of maltose to glucose. ✓ P

Glucose is then decomposed to ethanol by another enzyme zymase in yeast. ✓ ch

The resulting solution is crude ethanol which is converted to pure ethanol by fractional distillation. ✓ P

side effects.

The solid residues when poorly handled pollute the soil and water bodies killing the organism in soil and water. ✓ E

mitigation

Proper disposal of the solid residues and can also be used as food for pigs. ✓ M

(OR EQUIVALENT)

P=3

If learner has all RM and all v, cp, cd, ch, Pr

P=2

If learner has 1 RM and any three of v, cp, cd, ch, Pr

P=1

If learner has 1 RM and any 1 of v, cp, cd, ch, Pr

P=0 for no RM

no v, cp
cd, ch
PrS = D_L + E + M

S = 3

social benefits

Government will collect taxes hence increased revenue ^{B_i} which is used to improve infrastructure ^F

$$B = B_i + F + I = 3$$

like schools, roads, hospitals, and people will easily transport their other produce to get better health services etc ^I

(OR EQUIVALENT)

Item 5 ✓
 Water is renewable natural resource ✓
 because it can be replaced ✓
 composition: Hydrogen and oxygen ✓

$N=3$ if learner has CRE + both components

$N=2$ if learner has either C+R or C+E or A+E and 1 component

$N=1$ if learner has either C, or E or R and 1 component

$N=0$ if learner has no CRE, no component or has CRE but no component

Washing of clothes near lake, causes pouring of detergents in the water and these contain nutrients such as phosphates which cause growth of algae which uses oxygen causing suffocation of the fish (OR EQUIVALENT) ✓
 mitigation

$M = H + I + M$
 $M = 3$

I - impact of human activity

H - How it occurs

M - mitigation

Sensitize people about dangers of washing near the lake ✓
 M

Lakes are a habitat for fish which is food and also sold for income ✓
 Bi

$Be = Bi + E$

$Be = 2$

Bi = Benefits of conserving the resource

E = Explanation

OR (EQUIVALENT)

Item 6 ✓_F

Fossil fuel is non renewable natural resource ✓_{ci}
because it can not be replaced when
used up

composition: Carbon and Hydrogen ✓₂

Burning of fossil fuels produces
pollutant gases such as carbon dioxide
gas which traps a lot of heat in the
atmosphere causing global warming ✓_I

Mitigation

Using electric vehicles as an alternative
to petrol and diesel ✓_M

Fossil fuels can be used to make other
products such as vaseline and
water surfacing materials which are
environmental friendly ✓_F

$$N = C, RE + components$$

$$N = 3$$

(check item 5
for details)

$$M = H + I + M$$

$$M = 3$$

(check item 5 for
details)

$$Be = B_i + E$$