Structure {Paper02}

[SBPTrial10-02a]

(a) (i) Contact process
(ii) sulphuric acid

(iii) 1. Formula of reactant and product correct
2. Balanced
$2SO2 + O2 \rightarrow 2SO3$

[SPM08-01]

(a) Contact Proses

(b) Vanadium (V) Oxide // Vanadium Pentoxide

(c) (i) Oleum

(ii) $SO_3 + H_2SO_4 \rightarrow H_2S_2O_7$

(d) Dissolve /react/ combine with rain water/ water vapour
produce acid rain / acidic vapour

(e) Ammonium sulphate // sodium sulphate // potassium sulphate

(f) electrolyte in car battery / lead-acid accumulator
manufacturing of detergent
manufacturing of artificial fibres
manufacturing of paint
Leather tanning
manufacturing of dye
as catalyst
as dehydrating agent
remove oxide layer

[SBPdiag08-06]

(a)(i) Contact Process

(ii) $2SO_2 + O_2 \rightarrow 2SO_3$
$SO_3 + H_2SO_4 \rightarrow H_2S_2O_7$

(iii) Catalyst: vanadium (V) oxide
Temperature: $450^oC - 550^oC$
Pressure : 1 atm

(b) (i) Fertilizer
(ii) Neutralization

(iii) % of Nitrogen = $\frac{14 \times 2}{14(2)+1(8)+32+16(4)} \times 100$

$= \frac{28}{32} \times 100$

$= 21.21\%$

[SBPdiag06-03]

(a)(i) Contact Process

(ii) Sulphur react/ combine with oxygen / burn in air

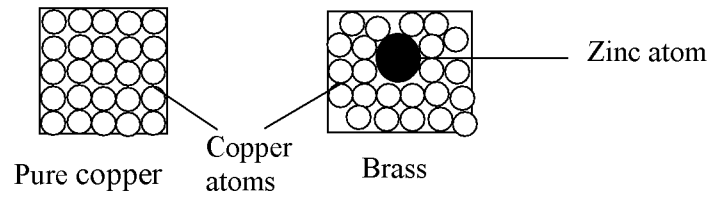
(iii) Vanadium (V) oxide/ *vanadium oxide (just give mark)*

(iv) $2\ SO_2 + O_2 \leftrightarrow 2SO_3$

(v) $H_2S_2O_7$

(b)(i) Zinc

(ii)



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(iii)
1. Zinc atoms with different size **disturb** the orderly arrangement of copper atoms.
2. Zinc atoms prevent the layer of copper atoms from **sliding**.

[SBPdiag05-05]

(a)(i) SO_2

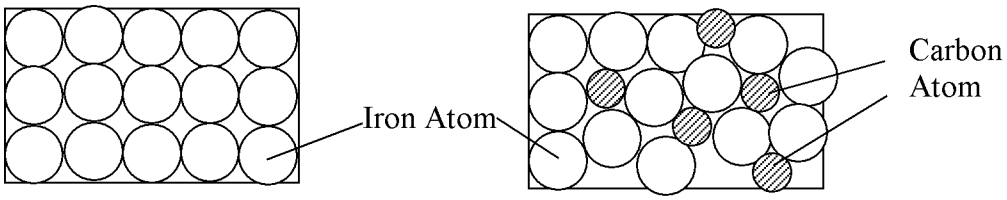
(ii) Use lime/ lime stone to absorb the sulphur dioxide gas

(iii) To make detergents // fertilisers // paint // polymer // electrolyte in accumulator (car battery)

(iv) 48 000 / 24 000 = 2 mol // 48 /24 = 2 mol
$2 \times 6.02 \times 10^{23}$ molecule

(b)(i) Steel / stainless steel

(b)(ii)



* carbon atom size must be small form iron atom.

(iii) Carbon atom disturb the arrangement of iron atom

Causes the layer of iron atom difficult to slide.

[MRSM10-01a]

(*a*) (i) Haber Process
(ii) Nitrogen gas
(iii) $H_2 + N_2 \rightarrow 2\ NH_3$

[SBPmidyearF508-03]

a (i) $3H_2 + N_2 \rightarrow 2NH_3$

(ii) (Extract from) air

b (i) Neutralization

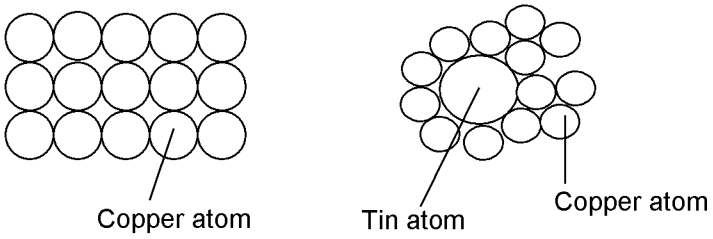
(ii) $H_2SO_4 + 2NH_3 + H_2O \rightarrow (NH_4)_2SO_4$

//$H_2SO_4 + 2NH_4OH \rightarrow (NH_4)_2SO_4 + H_2O$

(iii) Fertilizer

c (i) Tin

(ii)



(iii)

- In pure copper the layer of atom are easily slide over each other when external force is applied on them.
- The different size of foreign atoms in allloy are **prevent** the layers of atom **from slide** each other when external force is applied.

[SBPtrial04-06] {Translate}

(a) Proses Haber

(b) $N_2 + 3H_2 \rightarrow 2NH_3$

(c) ferum/besi

(d) suhu 450^0C, tekanan 200 atm

(e) ammonium sulfat

(f)(i) $2NH_3 + CO_2 \rightarrow CO(NH_2)_2 + H_2O$

(ii) $\frac{2 \times 14}{60} \times 100\%$

46.67%/46.7%

(g) 1. mendakan biru
2. larut dalam ammonia berlebihan membentuk larutan biru tua

[SPM07-02]

(a) X : contact , Y : Haber

(b)1. Sulphur, sulphur ore //galena// pyrite sulphide // any specific metal sulphide.
2. Air/oxygen , 3. Water

(c)(i) $H_2SO_4 + 2NH_3 \rightarrow (NH_4)_2SO_4$

(ii) sulphuric acid : 1 mol
ammonia : 2 mol

(d) as fertiliser

[SPM06-05]

(a) $N_2 + 3H_2 <\rightarrow 2NH_3$
formula correct [1]
balance[2]

(b) (i) The Percentage of factory Q is higher than the percentage of ammonia produce by factory P

(ii) The lower temperature can increase the percentage of ammonia

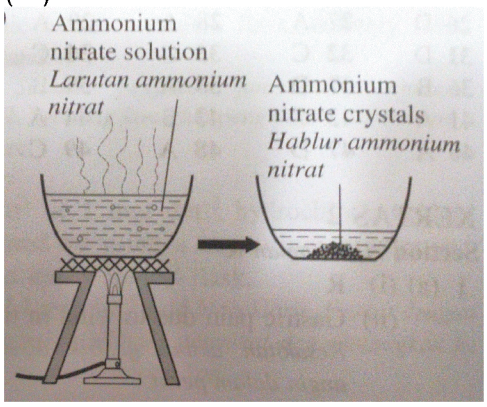
(iii) Can cause an explosion// explosion may occur // the maintenance cost of the factory becomes higher // reaction vessel need to be strengthened

(iv) By using a reactor / tank/ pipe that can withstand high pressure // increase the safety system of the machines in the factory // increase the cost to build tanks that can withstand high pressure.

(c) (i) Explosive // use in cold pack

(ii) $NH_3 + HNO_3 \rightarrow NH_4NO_3$

(iii)



[SPM03-03]

(a) Contact Process

(b) Sulphur trioxide

(c) The reaction will released so much heat energy, that dangerous to factory

(d) $H_2S_2O_7 + H_2O \rightarrow 2\ H_2SO_4$

(e) Substance Y: ammonia
Substance X: ammonium sulphate

(f) $SO_2 + H_2O \rightarrow H_2SO_3$

[SBPtrial06-06]

(a) (i) Proses Sentuh
(ii) Proses Haber

(b) (i) $2SO_2 + O_2 \leftrightarrow 2SO_3$
(ii) Vanadium pentoksida / Vanadium (V) oksida

(c)(i) $N_2 + 3H_2 \leftrightarrow 2NH_3$
(ii) Suhu 450°C
Tekanan 200atm

(d) (i) Ammonium sulfat
(ii) $(NH_4)_2SO_4$
(iii) Peratus Nitrogen = 21.2%

(e) Pembuatan baja kimia/elektrolit/ pembuatan detergen/ pigmen cat

[SPM09-01]

(a) An mixture of two or more elements with a certain fixed position in which the major component is a metal

(b) Brass

(c) Tin

(d)(i) Bronze is harder than pure copper

(ii)

Difference	**Bronze**	**Pure copper**
Size of atoms	Some are bigger	All of the same size
Arrangement of atoms	Not arranged in an orderly arrangement of atom of two types	Arranged in an orderly arrangement of atom of one type

(iii) Bronze : the layers of atom cannot slide on one another easily. The presence of atom of the other elements disturb

Pure copper : the layers of atom can slide on one another easily

(e) Pewter is used to make decorative items and gifts which are beautiful to look at

[SBPtrial11-01]

(a) (i) Zinc

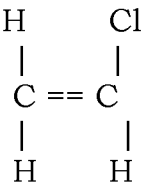
(ii) 1. The presence of X/zinc atoms disrupts the orderly arrangements of copper atoms
2. This reduce the layers of atoms from sliding over one another easily

(iii) Steel

(b)(i) Silicon dioxide/silica /sand

(ii) Heat resistant/can withstand with high temperature

(c) (i)



(ii) Polyvinyl chloride/ polychloroethene

(iii) polymerization

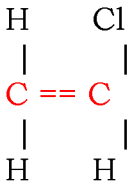
[SBPtrial07-04]

(a) Boron oxide

(b) (i) Tin

(ii) 1. The presence of tin atoms of different size from the atoms of copper distrupts the orderly arrangements of copper atoms
2. This prevents the layers of atoms from sliding over one another easily

(c) (i)



Does not corrode / rust

(ii) Reinforced concrete

(d) $2NH_3 + H_2SO_4 \rightarrow (NH_4)_2SO_4$//
$2NH_4OH + H_2SO_4 \rightarrow (NH_4)_2SO_4 + 2H_2O$

(e) (i) % N in $CO(NH_2)_2$ = $\frac{2(14)}{60} \times 100\% = 46.67\%$

% N in $(NH_4)_2SO_4$ = $\frac{2(14)}{132} \times 100 = 21.21\%$

(ii) Urea has higher **percentage of nitrogen** so it is more suitable for the growth of plants

[MRSM03-05]

Table 2 shows a few examples of industrial products.

Alloy	***Composite material***	***Soap***
Brass and bronze	Concrete, reinforced plastic	Sodium palmitate

Table 2

(a) (i) An mixture of two or more elements with a certain fixed position in which the major component is a metal

(ii) Copper and Tin

(iii) 1. The presence of tin atoms of different size from the atoms of copper distrupts the orderly arrangements of copper atoms
2. This prevents the layers of atoms from sliding over one another easily

(b) (i) Matrix phase and reinforcement

(ii) What is the matrix used in reinforced plastics? [1M]

Glass	Carbon	Kevlar
Silicon Carbide	Boron	Ceramic
Ceramic	Metallic	Aggregate

(iii) Steels/keluli

(c)(i) $CH_3(CH_2)_{14}COONa$

(ii) 1. The soap ion (negative) will react with H+ ions to carboxylic acids molecular
2. that are insoluble in water

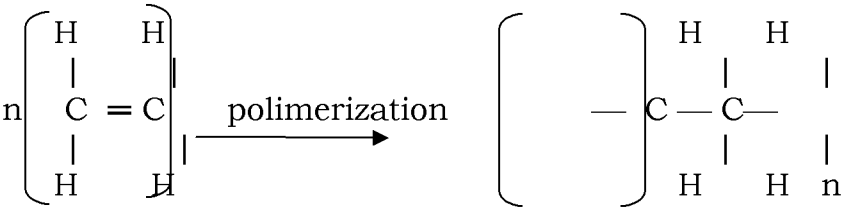
[SBPmidyearF507-06]

(a) A polymer is a large **long-chain molecule** formed by **joining** together many small **monomer** molecules.

(b) Starch / cellulose // polysacharide

(c) (i) protein : amino acid
(ii) polyethene : ethene

(d)



(e) Natural rubber/ wood/ cotton/any suitable example
Fat / polypeptide / carbohydrate /

(f) Petroleum.

(g) [Any one of the following two:]
- PVC is non-biodegradable. Thus, it can cause blockage of drainage system (As such it causes flash flood)
- Burning of PVC produces hydrogen chloride gas which is poisonous and acidic.

(h) Replacement for glass, lenses and optical fibres/ any suitable use

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