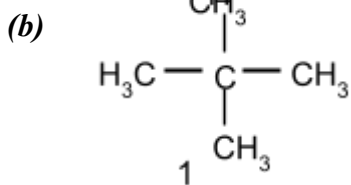
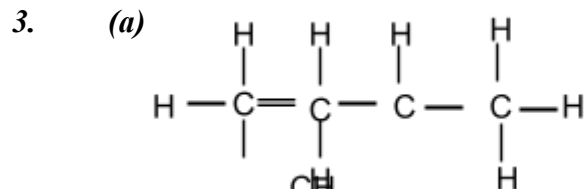


Organic chemistry 1

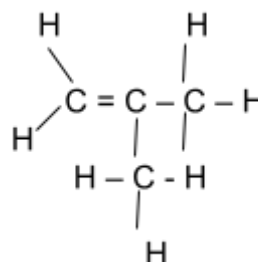
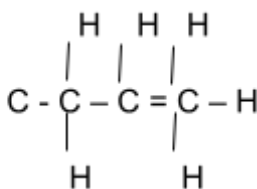
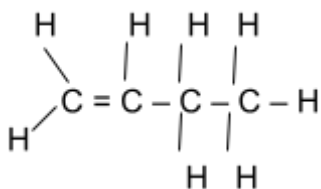
1.
 - a) *Bromine decolorized immediately in ethane gas* ✓
 - b) *Temperature between 150°C - 250°C or temperature of 180°C*
 - c) *Carbon (IV) oxide or CO_{2(g)}* ✓

2.
 - (a) *Butane*
 - (b) *Manufactures of cooking fats and margarine*



4. a) Existence of cpds with the same molecular formula but different structural formula/arrangement of atoms

b)



n - butane/ $\frac{1}{2}$

l - butane/
But-1-ene

2 - butane/ $\frac{1}{2}$

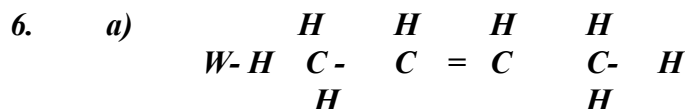
But-2-ene

2 - methyl
prop-1-ene

5. a) 2.5

b) Q Group 1 $\frac{1}{2}$, Period 4 $\frac{1}{2}$

R Group 2 $\frac{1}{2}$, Period 3 $\frac{1}{2}$



7. a) To produce simpler hydrocarbons of industrial importance e.g. ethane which is widely used

b) Elevated temperature / high temperature 900 C

Catalyst

c) $\text{HC} - \text{CCH}_3$

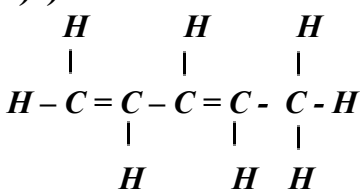
8. a) Reagent concentrated sulphuric acid

Condition temperature 180° C

9. a) $\text{H}_2\text{CHCLCHCLCH}_2\text{CH}_3$

Name: 2, 3 dichloropentane

b) i) Structural Formula



ii) IUPAC name

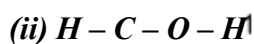
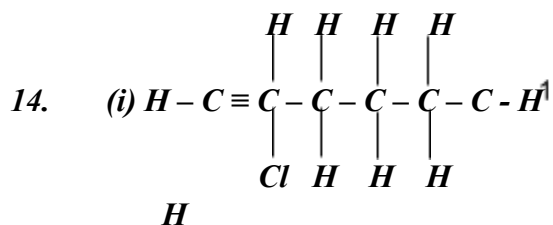
pent - 1,3 - diene

10. Isotopes are atoms of the same element with same atomic number but different mass numbers while isomers are compounds with the same molecular formula but different structural formula

11. Addition polymerization. $\sqrt{1}$

12. (a) When gases combine they do so in volume which bear a simple ratio to one another and to the product if gaseous under standard temperature and pressure

13. $CH_4 + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_{2(l)}$
 $\frac{10cm^3}{Volume\ of\ O_2} = \frac{20cm^3}{100} \times \frac{150}{100}$
 $= 30cm^3$
 Remaining volume of $O_2 = 30 - 20 = 10cm^3$
 Total volume of the gases = $20 + 10 + 10 = 40cm^3$



H

15. $T_2 = \frac{690 \times 15 \times 259}{650 \times 105} \sqrt{\frac{1}{1}}$
 $= 39.3K$
 $= -233.7^\circ C$



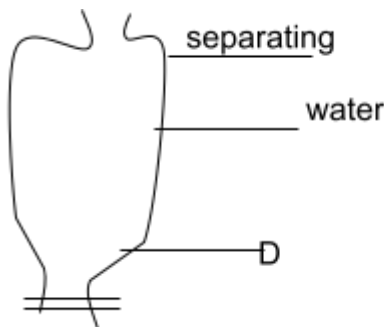
17 (a) i) Fractional Column.

ii) fractional distillation.

iii) different boiling points.

IV I A II F III B

b) G – road making or water proofing
 C jet fuel or cooking and lighting.



18. (i) ethyne

(ii) Alkynes – because it has triple bond between the two carbon atoms

(iii) Water is calcium carbide

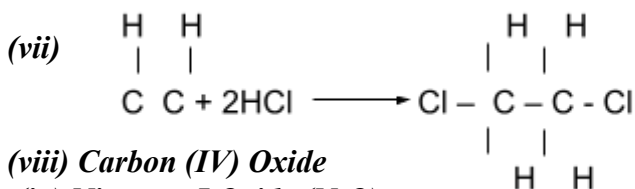
(iv) - Colourless, odourless

- less denser than air

- Insoluble in water but soluble in organic solvents

(v) Hydrogenation

(vi) Halogenations



(viii) Carbon (IV) Oxide

(ix) Nitrogen I Oxide (N_2O)

19. (a) (i) Gas /vapour

- (ii) B - It has the second lowest boiling point thus second lowest molecular mass
- (iii) C is impure since it boils over a range of temperature
- (iv) It is boiled heated and the vapour of the components condense at different temperatures
- (v) - Liquid air
- Crude oil

20. (a) (i) Gas /vapour
- (ii) B - It has the second lowest boiling point thus second lowest molecular mass
 - (iii) C is impure since it boils over a range of temperature
 - (iv) It is boiled heated and the vapour of the components condense at different temperatures
 - (v) - Liquid air
 - Crude oil

21. a) i) Bitumen it has the highest boiling point
- ii) Fractional distillation; during distillation petrol would distill off at 175C, while diesel will distill at 350C
 - iii) Each component is a mixture of hydrocarbons which have different boiling points
 - iv) Methane, CH₄, Ethane C₂H₆ propane, C₃H₈, Butane C₄H₁₀
- b) i) Burning in limited amount of air will produce carbon monoxide (carbon (II) Oxide) which is poisonous
- ii) Manufacture of Tar used in road tarmacking sealing of leakages on roofs

22. A. (i) Calcium carbide – CaC₂
- (ii) Over water method
 - (iii) $\text{CaC}_{2(s)} + 2\text{H}_2\text{O}_{(s)} + 2\text{H}_2\text{O}_{(l)} \longrightarrow \text{Ca}(\text{OH})_{2(aq)} + \text{C}_2\text{H}_{2(g)}$
 - (iv) $\text{C}_2\text{H}_2 + 2\text{I}_2 \longrightarrow \text{C}_2\text{H}_2\text{I}_2$
 - (v) The reaction is highly exothermic hence sand helps to absorb excess heat.

B. (i) A reaction in which an organism acid reacts with an alkanol to form a sweet smelling compound called ester.



(iii) Hydrolysis

C (i) F – Aluminium oxide – Al₂O₃

N – C₆H₁₄ – Hexane

(ii) Cracking

D. A fuel

23. i) Cracking of crude oil fractions. ✓1
- ii) Temp – 400 – 500°C
 - Pressure – 200 – 500 atmospheric Any 2 = 1
 - Catalyst – Finely divided iron.
 - iii) $4\text{NH}_3(g) + 5\text{O}_2(g) \longrightarrow 4\text{NO}(g) + 6\text{H}_2\text{O}(l)$
 - iv) - Manufacture of nitrate fertilizers. ✓1
 - Manufacture of explosives.
 - Purification of metals.
- b) - Red brown gas ✓1 with pungent irritating smell due to reduction of HNO₃ to NO₂
- Blue ✓1 solution due to formation of Cu (NO₃)₂
24. (a) (i) 2-bromo propene or 2- bromo prop-i-ene
- (ii) Pent-i-ene

- (b) (i) Changes from orange to Green
 (ii) Effervescence/bubbles of gas produced

(c) Step 1

- Fermentation of glucose
 Glucose broken down in absence of oxygen using enzymes
- Dehydration of ethanol; using concentrated sulphuric (VI) acid and high temperature of 170°C

Step II

- Dehydration of ethanol; using concentrated sulphuric (VI) acid and high temperature of 170°C

(d) Compound A

(e) – release chlorine gas which destroys ozone layer

- Chlorine gas combines with vapour in atmosphere to form acid rain which destroys vegetation
- Chlorine gas can cause respiratory diseases

25. (a) (i) 2,2 – dimethyl pentane

(b) I carbon IV oxide.

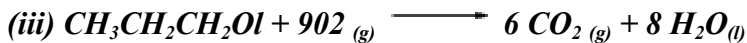
II Hydrogen gas.

III Propane.

(ii) I Hydrogenation.

II Neutralization

III substitution



(iv) Condition Presence of U.V light

Reagents – Chlorine gas



Mole ratio :

74 tones of acid

21.9

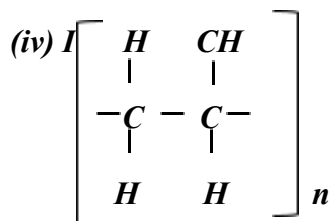
96 tones of salt

$$\frac{21.9 \times 96}{74} = 28.4 \text{ tones}$$

Or $\frac{21.9}{74} = 0.29 \text{ moles of salt}$

74

$$= 0.29 \times 96 = 28.4 \text{ tones}$$

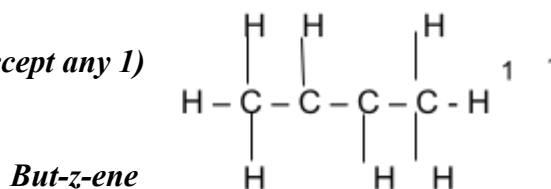
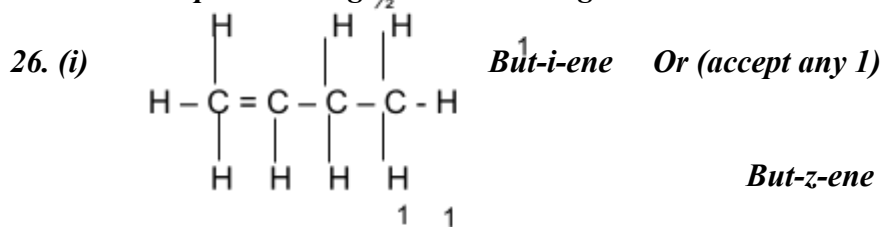


(ii) use in making – Plastic crates plastic boxes plastic ropes

(c) I (i) soap detergent

(ii) Soap less detergent

II Soap less Detergent - non biodegradable.



(ii) Bromine water is decolourised because X is unsaturated or has a (-C = C-) double bond.



27. a) i) Propane
ii) But-2-yne
- b) i) Polythene
ii) Bubble pass ethane gas in acidified $KMnO_4$ or acidified $K_2Cr_2O_7$
- c) i) C_nH_{2n}
ii) @5H10
- d) i) Step I – hydrogen
Step II – Hydrogen chloride
Step IV – Sodalime

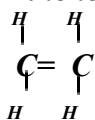


- A fuel
- Manufacture of methanol
- Manufacture of methanol

28. i) 2-Methylprop-1-ene ✓ 1 mark
ii) Pent-1-yne ✓ 1 mark [Total 12 marks]

29. The melting point increases from A to C this is due to increase in number delocalized electron hence increase in the strength of metallic bond.
D forms a giant structure with strong covalent bonds. Hence high melting.
It exhibits allotropy i.e. may exist as two different forms in the same state.
 C_{24} (so4)³⁻
Noble gases or inert
Used in filament bulbs
Used to produce an inert atmosphere in high temperature metallurgical processes e.g. welding.
C is amphoteric oxide
F acidic it is non-metal oxide.

Ethene



Acidified potassium Manganate(VII) + bromine water to form a colourless solution

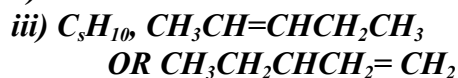


Nickel catalyst

30. a) i) Bitumen it has the highest boiling point
ii) Fractional distillation; during distillation petrol would distill off at 175°C, while diesel will distill at 350°C
iii) Each component is a mixture of hydrocarbons which have different boiling points
iv) Methane, CH_4 , Ethane C_2H_6 , propane, C_3H_8 , Butane C_4H_{10}

- b) i) Burning in limited amount of air will produce carbon monoxide (carbon (II) Oxide) which is poisonous
 ii) Manufacture of Tar used in road tarmacking sealing of leakages on roofs

31. i) C_nH_{2n} , where n = No. of carbon atoms
 ii) 70



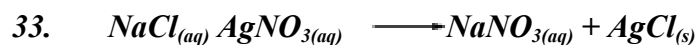
32. (a) Hydrocarbon. $\sqrt{1}$

(b) Black specks is carbon.

Colourless gas is steam

Hydrocarbon burn in O_2 to form carbon $\sqrt{1/2}$ and water $\sqrt{1/2}$

3



Moles of $AgCl$ = $\frac{\text{Mass}}{\text{R.F.M}}$

R.F.M

$$= \frac{2.36}{143.5}$$

$$= 0.016446 \text{ moles}$$

$$= 0.016446 \text{ moles} \times \frac{1}{2}$$

Mole ratio $NaCl : AgCl$

$$1 : 1$$

$$\times \frac{1}{2}$$

Moles of $NaCl$ = 0.016446 moles

Mass of $NaCl$ = $\text{RFM} \times \text{moles}$

$$= 58.5 \times 0.016446$$

$$= 0.962091 \text{ g}$$

Mass of solvent (water) = $2.63 - 0.962091$

$$= 1.667909 \text{ g}$$

1.667909 g of water dissolves 0.962091 g of $NaCl$

100 g of water dissolves = $\frac{100 \times 0.962091 \text{ g}}{1.667909}$

$$= 57.68/100 \text{ g of water}$$

$$= 57.68/100 \text{ g of water} \times \frac{1}{2}$$

33. $24000 \text{ cm}^3 = 1 \text{ mol}$

$$80 \text{ cm}^3 = \frac{80 \times 1}{2400}$$

$$= 0.00333 \text{ moles}$$

$$= 0.00333 \text{ moles}$$

34.. (i) $CH_3CH=CHCH_3$ – But-2-ene

(ii) $CH_3C=CH_2$; 2-methyl 1 prop-1-ene



(iii) $CH_2=CHCH_2CH_3$ – But-1-ene

35. (a) Octane



36. a) Existence of same molecular formula but different structural formula $\sqrt{1}$

b) i)