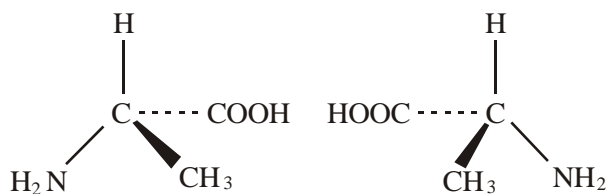


HL Organic Packet Key

- | | | |
|-----|---|-----|
| 1. | A | [1] |
| 2. | D | [1] |
| 3. | C | [1] |
| 4. | D | [1] |
| 5. | C | [1] |
| 6. | D | [1] |
| 7. | B | [1] |
| 8. | C | [1] |
| 9. | D | [1] |
| 10. | B | [1] |
| 11. | A | [1] |
| 12. | B | [1] |
| 13. | A | [1] |
| 14. | C | [1] |
| 15. | B | [1] |
| 16. | D | [1] |
| 17. | D | [1] |
| 18. | A | [1] |
| 19. | C | [1] |
| 20. | A | [1] |
| 21. | D | [1] |
| 22. | C | [1] |
| 23. | B | [1] |

24. C [1]
25. A [1]
26. A [1]
27. D [1]
28. B [1]
29. C [1]
30. D [1]
31. (i) $\text{CH}_3\text{OH} + \text{HCOOH} \rightarrow \text{HCOOCH}_3 + \text{H}_2\text{O}$ 3
[1] for both reactants and [1] for both products (accept $\text{C}_2\text{H}_4\text{O}_2$) methyl methanoate;
- (ii) ethanoic acid; 1 [4]
32. (i) $\text{CH}_2\text{OH COOH}$ 3
 alcohol (accept hydroxy(l));
 carboxylic acid;
Last two marks dependent on correct monomer or reasonable attempt at identifying the monomer.
- (ii) condensation; 2
 eliminates H_2O /a small molecule is eliminated; [5]
33. (i) $\text{COOH (CH}_2)_4\text{COOH};$ 2
 $\text{NH}_2(\text{CH}_2)_6\text{NH}_2;$
Accept more detailed formulas.
Award [1] for correct functional groups for both compounds but wrong formulas.
- (ii) condensation (polymerization); 2
 two functional groups on each monomer/OWTTE;
- (iii)
- $$\begin{array}{c} \text{O} \quad \text{H} \\ \parallel \quad | \\ -\text{C}-\text{N}- \end{array}$$
- accept —CONH—*
- peptide/amide; 3
 water/ H_2O ;

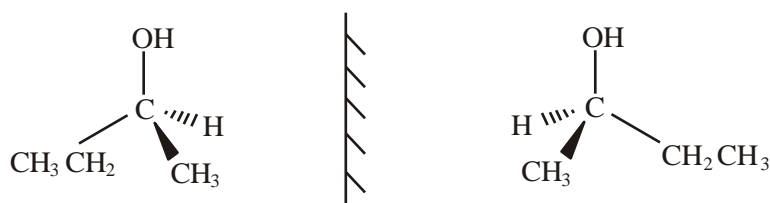
- (iv) rotate the plane of (plane-)polarized light; asymmetric carbon atom /chiral centre; 3



- (v) glycine/Gly/ $\text{H}_2\text{N}-\text{CH}_2-\text{COOH}$; 1
- (vi) flavouring agents/plasticizers/solvents/perfumes; ethanol; methanoic acid; 3

[14]

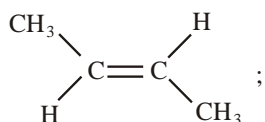
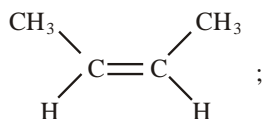
34. (i)



Award [2] for both tetrahedral structures, or [1] if tetrahedral structure is not clear. 2

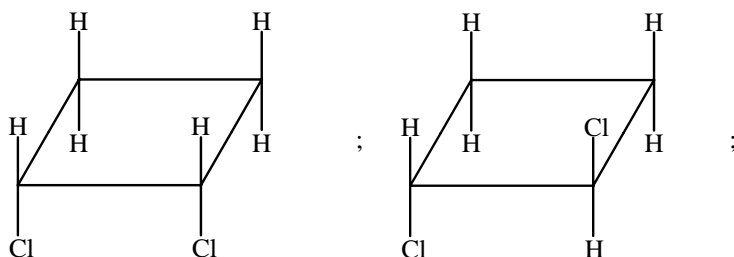
- (ii) plane polarized light; rotation in opposite/different directions; 2

(iii)



2

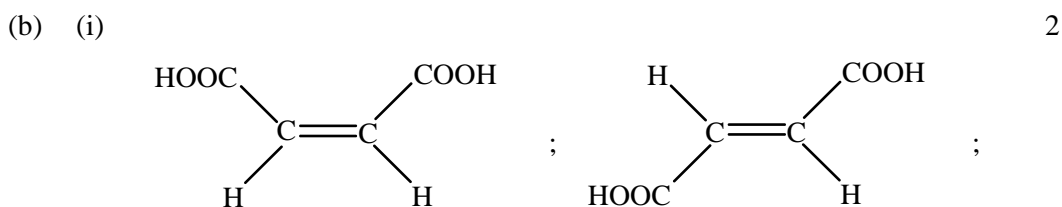
35. (a) restricted rotation because C–C bond is now part of a cyclic system; 3



Award [1] for each correct 3D structure.

If correct structure, but not 3D, or wrongly labelled award [1] only.

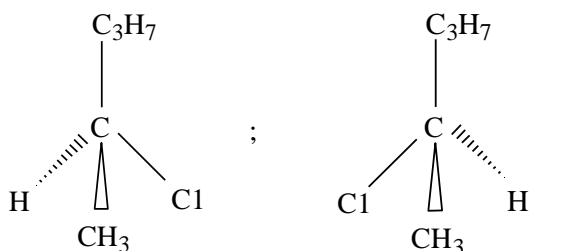
Accept 1,3-disubstituted cyclo compound, or any other correct isomer.



(ii) cis isomer (has lower melting point than the trans-isomer);
intramolecular hydrogen bonds/weaker intermolecular forces
/less close packing; 2

(iii) (gentle) heating of a sample of each isomer;
cis isomer readily releases water vapour (forming a cyclic anhydride); 2

(c) (i) 2-chloropentane;



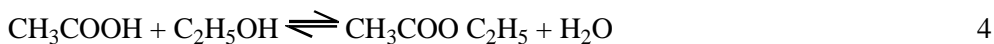
Award [1] for each correct 3D structure.

If correct structures, but not 3D, award [1] only.

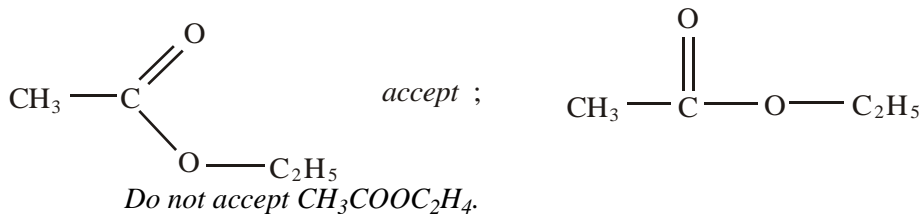
(ii) rotation of the plane polarized light in opposite directions; 1

[13]

36. (i) esterification/condensation;



Accept product: ethyl ethanoate/ethyl acetate;
structure:



(ii) catalyst;
lowers E_a (by providing an alternate pathway); 2

(iii) flavouring agents/in plasticisers/in solvents/in perfumes/making aspirin 1

[7]

37. (a) substitution;
nucleophilic;
bimolecular/two species in rate-determining or slowest step;
Do not accept second order.
Three correct [2], two correct [1], one correct [0].

2 max

(b) aminoethane/ethylamine; 1