ALBERTA CHEM 261 · FULL COURSE · 50 QUESTIONS

Full Course — Practice Test

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

1 **The hybridization of carbon in methane, CH_4, is**

- A sp^3
- B sp^2
- C sp
- D sp^3d

Understand It with Pulse | Flag a mistake

2 **The formal charge on oxygen in the hydronium ion, H_3O^+, is**

- A -1
- B +1
- C 0
- D +2

Understand It with Pulse | Flag a mistake

3 **The degrees of unsaturation for C_5H_8 is**

A 0

B 1

C 2

D 3

Understand It with Pulse | Flag a mistake

4 **The IUPAC name of $CH_3CH(CH_3)CH_2CH_3$ is**

A butane

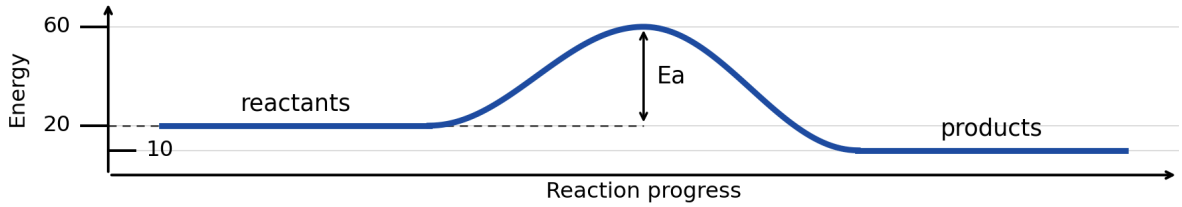
B pentane

C 3-methylbutane

D 2-methylbutane

Understand It with Pulse | Flag a mistake

5 **The energy diagram for a reaction is shown. The reaction is**



- **A** Exothermic
- **B** Endothermic
- **C** Neutral
- **D** Reversible only

Understand It with Pulse | Flag a mistake

6 **The number of major resonance structures for the carbonate ion, CO_3^{2-}, is**

- **A** 2
- **B** 3
- **C** 1
- **D** 4

Understand It with Pulse | Flag a mistake

7 **The strongest acid among the following is**

A ethanol

B phenol

C acetic acid

D water

Understand It with Pulse | Flag a mistake

8 **A Lewis base is a species that**

A accepts an electron pair

B donates a proton

C accepts a proton only

D donates an electron pair

Understand It with Pulse | Flag a mistake

9 **For butane viewed along the C_2-C_3 bond, the most stable conformation is**

A anti staggered

B syn eclipsed

C gauche staggered

D partly eclipsed

Understand It with Pulse | Flag a mistake

10 **In a chair cyclohexane, a methyl group is most stable in the**

A axial position

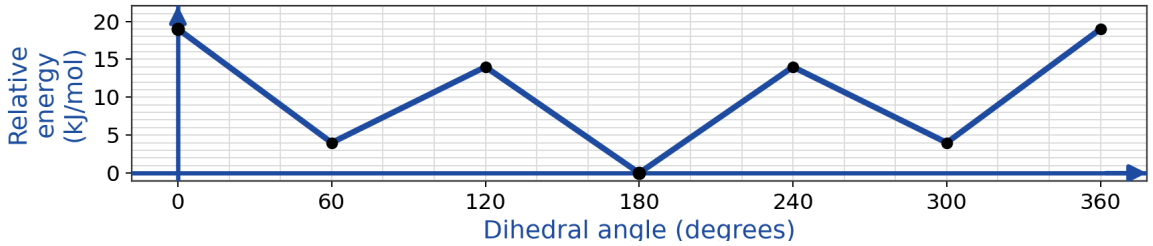
B equatorial position

C planar position

D eclipsed position

Understand It with Pulse | Flag a mistake

11 **The graph shows the relative energy of butane against dihedral angle. The lowest energy angle is**



A 0 degrees

B 60 degrees

C 120 degrees

D 180 degrees

Understand It with Pulse | Flag a mistake

12 **The chiral centre in butan-2-ol is carbon**

A 1

B 3

C 4

D 2

Understand It with Pulse | Flag a mistake

13 **A pair of enantiomers rotate plane polarized light**

A by equal amounts in opposite directions

B by equal amounts in the same direction

C not at all

D by very different amounts

Understand It with Pulse | Flag a mistake

14 **A meso compound is optically inactive because it has**

A no stereocentres

B an internal plane of symmetry

C only single bonds

D no carbon atoms

Understand It with Pulse | Flag a mistake

15 **At the stereocentre of butan-2-ol, the priority order is**

- **A** methyl first, then hydroxyl
- **B** hydrogen first, then hydroxyl
- **C** hydroxyl, ethyl, methyl, hydrogen
- **D** ethyl, hydroxyl, methyl, hydrogen

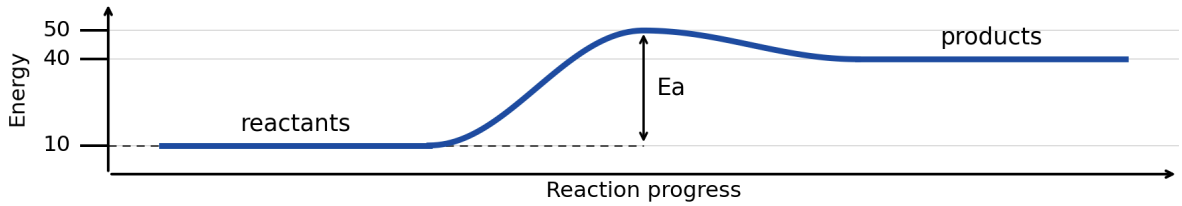
Understand It with Pulse | Flag a mistake

16 **If the two high priority groups on an alkene are on opposite sides, the descriptor is**

- **A** Z
- **B** cis only
- **C** not assignable
- **D** E

Understand It with Pulse | Flag a mistake

17 **The energy diagram for a reaction is shown. The double arrow labelled Ea measures the difference between**



A the peak and the products

B the reactants and the products

C the peak and the reactants

D the reactants and zero

Understand It with Pulse | Flag a mistake

18 **A racemic mixture is optically inactive because**

A each molecule is achiral

B equal enantiomers cancel each others rotation

C it has a plane in each molecule

D it contains no stereocentres

Understand It with Pulse | Flag a mistake

19 **For replacing a tertiary hydrogen selectively, the more selective halogenation is**

A chlorination

B both are equally unselective

C bromination

D iodination in the dark

Understand It with Pulse | Flag a mistake

20 **In radical halogenation, a propagation step is one in which a radical**

A is first formed from a stable molecule

B combines with another radical and ends

C is destroyed with no product formed

D reacts to give product and a new radical

Understand It with Pulse | Flag a mistake

21 **The reactivity order for an SN2 reaction is**

A methyl fastest, then primary, secondary, tertiary

B tertiary fastest, then secondary, primary, methyl

C tertiary and methyl are equally fastest

D all classes react at the same rate

Understand It with Pulse | Flag a mistake

22 **An SN2 reaction at a stereocentre proceeds with**

A retention of configuration

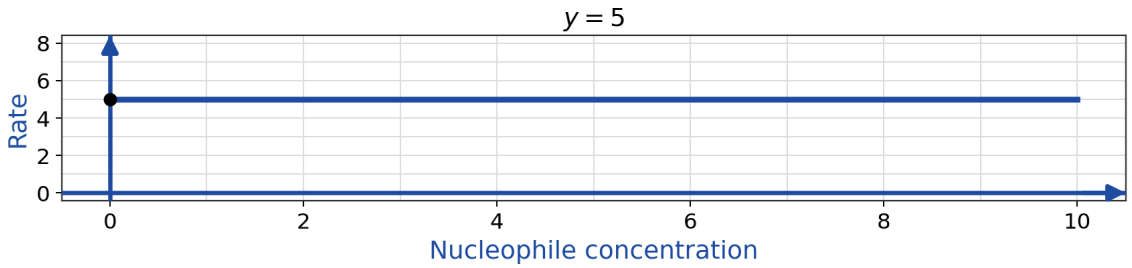
B inversion of configuration

C complete racemization

D loss of the stereocentre only

Understand It with Pulse | Flag a mistake

23 **The graph shows the rate of a reaction against nucleophile concentration. The rate**



- **A** increases with nucleophile concentration
- **B** is independent of nucleophile concentration
- **C** falls to zero at high concentration
- **D** doubles when concentration doubles

Understand It with Pulse **Flag a mistake**

24 **Among fluoride, chloride, bromide and iodide, the best leaving group is**

A fluoride

B chloride

C bromide

D iodide

Understand It with Pulse | Flag a mistake

25 **The solvent type that usually speeds an SN2 reaction most is**

A polar aprotic

B polar protic

C nonpolar

D water alone

Understand It with Pulse | Flag a mistake

26 **A strong bulky base reacting with a secondary alkyl halide mainly favours**

A substitution by SN2

B elimination by E2

C substitution by SN1

D addition to the carbon

Understand It with Pulse | Flag a mistake

27 **A tertiary alkyl halide in aqueous ethanol with no strong base reacts mainly by**

A SN2

B E2 only

C SN1

D radical substitution

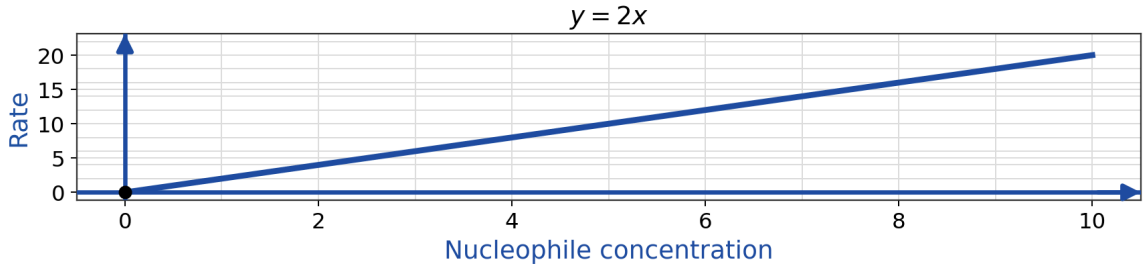
Understand It with Pulse | Flag a mistake

28 **The rate of an SN1 reaction depends on the concentration of**

- **A** both substrate and nucleophile equally
- **B** the nucleophile only
- **C** neither reactant
- **D** the alkyl halide only

Understand It with Pulse | Flag a mistake

29 **The graph shows the rate of a reaction against nucleophile concentration. When the concentration doubles, the rate**



- **A** is unchanged
- **B** is halved
- **C** doubles
- **D** is quadrupled

Understand It with Pulse | Flag a mistake

30 **Hydroboration and oxidation of propene gives mainly**

A propan-2-ol

B propan-1-ol

C propanone

D propanal

Understand It with Pulse | Flag a mistake

31 **Propene reacts with Br_2 to give mainly**

A 1-bromopropane

B 2-bromopropane

C 1,2-dibromopropane

D 1,1-dibromopropane

Understand It with Pulse | Flag a mistake

32 **Acid catalyzed hydration of propene gives mainly**

A propan-1-ol

B propanal

C propanone

D propan-2-ol

Understand It with Pulse | Flag a mistake

33 **Hydrogenation of but-2-ene with H_2 and platinum gives**

A butane

B but-1-ene

C but-2-yne

D butan-2-ol

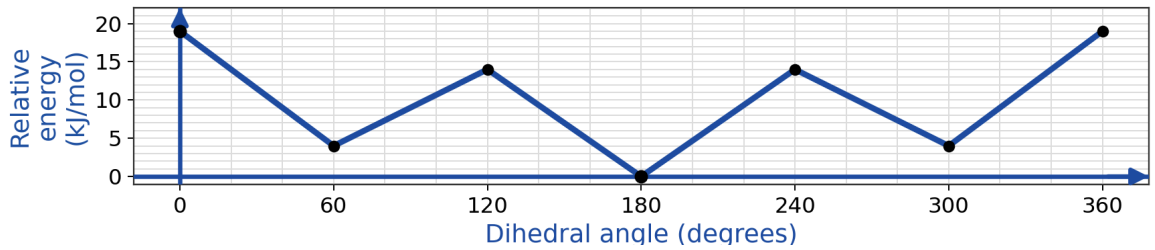
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34 **Ozonolysis of but-2-ene followed by zinc workup gives mainly**

- **A** methanal
- **B** ethanal
- **C** propanal
- **D** propanone

Understand It with Pulse | Flag a mistake

35 **The graph shows the relative energy of butane against dihedral angle. The energy of the gauche form above the anti form is about**



- **A** 0 kJ/mol
- **B** 4 kJ/mol
- **C** 14 kJ/mol
- **D** 19 kJ/mol

Understand It with Pulse | Flag a mistake

36 **Acid catalyzed hydration of 3-methylbut-1-ene gives, after rearrangement, mainly**

A 3-methylbutan-1-ol

B 3-methylbutan-2-ol

C pentan-2-ol

D 2-methylbutan-2-ol

Understand It with Pulse | Flag a mistake

37 **Among ethyne, ethene and ethane, the most acidic hydrocarbon is**

A ethyne

B ethene

C ethane

D benzene

Understand It with Pulse | Flag a mistake

38 **Hydration of propyne with aqueous acid and mercury catalyst gives**

- A propanal
- B propanone
- C propan-1-ol
- D propanoic acid

Understand It with Pulse | Flag a mistake

39 **But-2-yne reacting with excess Br_2 gives mainly**

- A a dibromoalkene only
- B 2-bromobutane
- C 2,2,3,3-tetrabromobutane
- D 1,2-dibromobutane

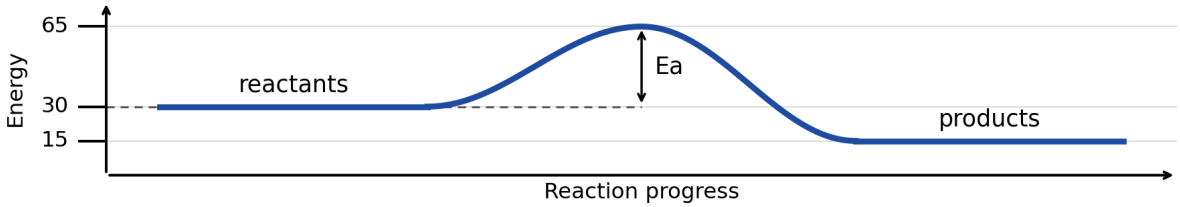
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40 **Hydrogenation of an alkyne with Lindlar catalyst stops at the**

- **A** fully saturated alkane
- **B** trans alkene
- **C** unchanged alkyne
- **D** cis alkene

Understand It with Pulse | Flag a mistake

41 **The energy diagram for a reaction is shown. The highest energy point on the diagram is the**



- **A** reactants
- **B** products
- **C** peak
- **D** starting point only

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42 **Oxidation of propan-1-ol with PCC gives mainly**

A propanoic acid

B propanal

C propanone

D propane

Understand It with Pulse | Flag a mistake

43 **The Williamson ether synthesis combines an alkoxide with a**

A tertiary alkyl halide for SN2

B carboxylic acid in water

C primary alkyl halide for SN2

D strong acid and an alkene

Understand It with Pulse | Flag a mistake

44 **The most acidic compound among the following is**

A ethanol

B cyclohexanol

C water

D phenol

Understand It with Pulse | Flag a mistake

45 **Reduction of propanone with $NaBH_4$ gives**

A propan-2-ol

B propan-1-ol

C propene

D propane

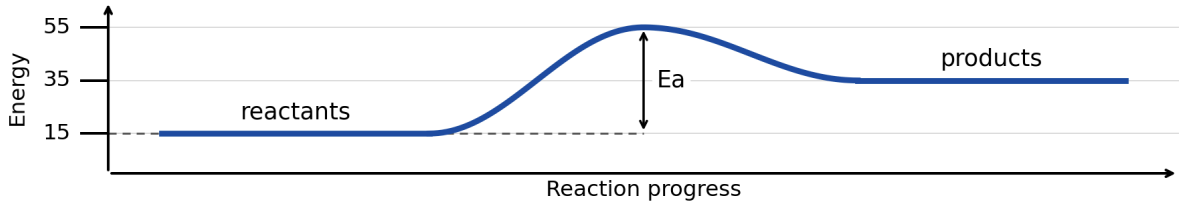
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46 **Gauche butane is higher in energy than anti butane mainly because of**

- **A** hydrogen bonding between methyls
- **B** steric repulsion between the methyl groups
- **C** resonance in the anti form only
- **D** ionic bonding in the gauche form

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47 **The energy diagram for a reaction is shown. Compared with the reactants, the products are at**



- **A** a lower energy
- **B** a higher energy
- **C** the same energy
- **D** zero energy

Understand It with Pulse | Flag a mistake

48 **A three carbon chain with a triple bond between carbons 1 and 2 is named**

A butyne

B propene

C propane

D propyne

Understand It with Pulse | Flag a mistake

49 **For an E2 reaction, the hydrogen and leaving group should be**

A anti periplanar

B syn periplanar only

C gauche to each other

D on different molecules

Understand It with Pulse | Flag a mistake

50 **An SN1 reaction is favoured most by a**

A nonpolar solvent

B polar protic solvent

C gas phase reaction

D very strong bulky base

Understand It with Pulse | Flag a mistake

ANSWER KEY

1. A
2. B
3. C
4. D
5. A
6. B
7. C
8. D
9. A
10. B
11. D
12. D
13. A
14. B
15. C
16. D
17. C
18. B
19. C
20. D
21. A
22. B
23. B
24. D
25. A
26. B
27. C
28. D
29. C
30. B
31. C
32. D
33. A
34. B
35. B
36. D
37. A
38. B
39. C
40. D
41. C
42. B
43. C
44. D
45. A
46. B
47. B
48. D
49. A
50. B

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