Organic Chemistry Practice Exam B

STUDENT PRACTICE WORKSHEET • WORKSPACE PROVIDED

Name: _____ Date: _____

Directions: Select the best answer for each question. Show reasoning on the space provided.

1. **2-Bromobutane is heated with sodium ethoxide in ethanol. Which pathway is generally favored?**

   A. SN1

   B. SN2

   C. E1

   D. E2

   Reasoning / work:

2. **Iodomethane and NaCN in DMSO: expected mechanism?**

   A. SN1

   B. E1

   C. SN2

   D. E2

   Reasoning / work:

3. **An SN2 reaction follows which idealized rate law?**

   A. rate = k[RX]

   B. rate = k[Nu]

   C. rate = k[RX][Nu]

   D. rate = $k[RX]^2$

   Reasoning / work:

4. **At a stereogenic carbon, an SN2 reaction normally produces which geometric outcome?**

   A. Retention

   B. Inversion

   C. Complete racemization

   D. No stereochemical change

   Reasoning / work:

5. **Two highest-priority groups on an alkene are on opposite sides. It is:**

   A. E

   B. Z

C. R

D. S

Reasoning / work:

6. What does a racemic sample contain?

A. One enantiomer only

B. Equal amounts of both enantiomers

C. Two constitutional isomers

D. Only achiral compounds

Reasoning / work:

7. Which statement about stereochemical labels in SN2 is most accurate?

A. R always becomes S

B. S always becomes R

C. The geometry inverts, but the R/S label depends on CIP priorities

D. SN2 is always racemic

Reasoning / work:

8. A carboxylic acid O–H stretch is often characterized by:

A. Sharp peak at 2250 cm−1

B. Very broad absorption about 2500–3300 cm−1

C. Single sharp peak at 1600 cm−1

D. No IR absorption

Reasoning / work:

9. An aromatic proton often resonates in approximately which ^{1}H NMR region?

A. 0–1 ppm

B. 6.5–8.5 ppm

C. 12–16 ppm

D. 18–20 ppm

Reasoning / work:

10. A TLC spot travels 2.4 cm while the solvent front travels 6.0 cm. Rf = ?

A. 0.25

B. 0.40

C. 2.5

D. 3.6

Reasoning / work:

11. Which reagent converts propanone into propan-2-ol?

A. $NaBH_4$, then workup

B. PCC

C. $KMnO_4$, hot

D. $Br_2/h\nu$

Reasoning / work:

12. Cyclohexene can be converted to cyclohexanol with:

A. Aqueous acid-catalyzed hydration

B. PCC

C. $NaNH_2/NH_3$

D. NaI/acetone

Reasoning / work:

13. 2-Butyne treated with H_2 and Lindlar catalyst yields predominantly:

A. trans-2-butene

B. cis-2-butene

C. Butane

D. 2-butanol

Reasoning / work:

14. $NaBH_4$ followed by aqueous workup reduces a simple ketone to:

A. A primary alcohol

B. A secondary alcohol

C. An ester

D. An alkene

Reasoning / work:

15. Strong aqueous chromium(VI) oxidation of a primary alcohol commonly yields:

A. An aldehyde only

B. A carboxylic acid

C. A tertiary alcohol

D. An ether

Reasoning / work:

16. Formaldehyde + Grignard reagent, then workup, gives:

A. A primary alcohol

B. A secondary alcohol

C. A tertiary alcohol

D. An ester

Reasoning / work:

17. Under acidic aqueous hydrolysis, a typical amide can ultimately produce:

A. Carboxylic acid and protonated amine/ammonium species

B. Alkene and hydrogen

C. Ester and HCl

D. Epoxide and ether

Reasoning / work:

18. Which is a Lewis base?

A. Electron-pair donor

B. Electron-pair acceptor

C. Only a proton donor

D. A compound with no electrons

Reasoning / work:

19. Which reagent is typically a strong nucleophile but relatively weak base?

A. N_3^-

B. tert-Butoxide

C. H_2O

D. tert-Butanol

Reasoning / work:

20. Which geometric condition is associated with a typical alkene π bond?

A. Restricted rotation about C=C

B. Free rotation about C=C at room temperature

C. No p orbitals

D. Carbon bonded to six atoms

Reasoning / work: