Carbonyl & Multistep Synthesis Practice

STUDENT PRACTICE WORKSHEET • WORKSPACE PROVIDED

Name: _____ Date: _____

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

1. NaBH4 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:

2. NaBH4 followed by workup reduces an aldehyde (other than formaldehyde) to:

A. A primary alcohol

B. A tertiary alcohol

C. A ketone

D. An epoxide

Reasoning / work:

3. PCC oxidation of a simple primary alcohol under anhydrous conditions normally stops at:

A. A ketone

B. An aldehyde

C. An ester

D. An alkene

Reasoning / work:

4. 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:

5. A carboxylic acid and alcohol under acid catalysis and reversible conditions form:

A. An ester and water

B. An amide and ammonia

C. A ketone and hydrogen

D. An epoxide

Reasoning / work:

6. Ketone + Grignard reagent, then H3O+ workup, generally gives:

A. Primary alcohol

B. Secondary alcohol

C. Tertiary alcohol

D. Carboxylic acid

Reasoning / work:

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

A. A primary alcohol

B. A secondary alcohol

C. A tertiary alcohol

D. An ester

Reasoning / work:

8. A nitrile group can often be identified by which IR feature?

A. Strong broad OH 2500–3300

B. Sharp absorption near 2250

C. Aldehyde H near 9.7 ppm

D. Strong C=O near 1715

Reasoning / work:

9. Which reagent converts 1-bromobutane to 1-iodobutane most directly?

A. NaI in acetone

B. H2/Pd

C. PCC

D. H2SO4/H2O

Reasoning / work:

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

A. NaBH4, then workup

B. PCC

C. KMnO4, hot

D. Br2/hν

Reasoning / work:

11. Which reagent converts propanal into propan-1-ol?

A. NaBH4, then workup

B. PCC

C. Ag2O only

D. NaOEt/EtOH

Reasoning / work:

12. Which reagent adds HBr across ethene to produce bromoethane?

A. HBr

B. NaBH4

C. NaI in acetone

D. PCC

Reasoning / work:

13. Cyclohexene can be converted to cyclohexanol with:

A. Aqueous acid-catalyzed hydration

B. PCC

C. NaNH2/NH3

D. NaI/acetone

Reasoning / work:

14. Which sequence converts cyclohexene into trans-1,2-cyclohexanediol?

A. mCPBA, then aqueous acid

B. H2/Pd

C. PCC, then water

D. NaBH4, then water

Reasoning / work:

15. Excess H2/Pd converts 1-butyne into:

A. 1-butene

B. cis-2-butene

C. Butane

D. Butanal

Reasoning / work: