Spectroscopy & Structure Practice

STUDENT PRACTICE WORKSHEET • WORKSPACE PROVIDED

Name: _____ Date: _____

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

1. A strong IR absorption near 1715 cm−1 is consistent with:

A. C=O stretch in a simple saturated ketone

B. C≡N stretch

C. O–H stretch only

D. C–H bending only

Reasoning / work:

2. A broad IR band spanning roughly 3200–3600 cm−1 often indicates:

A. Alcohol O–H

B. Nitrile C≡N

C. Alkyne C≡C only

D. Carbonyl C=O

Reasoning / work:

3. 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:

4. A relatively sharp IR absorption around 2250 cm−1 can indicate:

A. C≡N

B. C–O single bond

C. Alcohol O–H

D. Alkane C–H

Reasoning / work:

5. An aldehydic ^{1}H NMR signal commonly appears near:

A. 0–1 ppm

B. 2–3 ppm

C. 9–10 ppm

D. 14–16 ppm

Reasoning / work:

6. 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:

7. An ethyl fragment often shows what integration and splitting pattern in first-order ^{1}H NMR?

A. 3H triplet and 2H quartet

B. 3H singlet and 3H singlet

C. 1H septet and 6H doublet

D. 2H singlet and 2H singlet

Reasoning / work:

8. A 6H doublet plus 1H septet can support which fragment?

A. Methoxy group

B. Isopropyl group

C. Ethene

D. Aldehyde

Reasoning / work:

9. 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:

10. In simple acetone, the two methyl groups give what expected ^{1}H NMR pattern?

A. Two 3H doublets

B. One 6H singlet

C. One 3H triplet

D. One 1H aldehyde singlet

Reasoning / work:

11. A curved arrow in an organic mechanism starts at:

A. The electron source

B. The atom receiving electrons only

C. The positive charge always

D. The reaction arrow

Reasoning / work:

12. Lower pKa generally indicates:

A. Stronger acid

B. Weaker acid

C. Stronger base only

D. No connection to acidity

Reasoning / work:

13. 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:

14. What is the degree of unsaturation for C6H12O (neutral closed-shell)?

A. 0

B. 1

C. 2

D. 3

Reasoning / work:

15. What is the degree of unsaturation for C6H6?

A. 2

B. 3

C. 4

D. 5

Reasoning / work: