Name:
Score: 0 / 20 points (0%)

Chapter 15 Review Quiz

Multiple Choice

Identify the choice that best completes the statement or answers the question.

___ 1. The product formed when bromine is added to propene is:
a. $CH_3CH_2CH_2Br$
b. $CH_3CHBrCH_2Br$
c. $CH_2BrCH_2CH_2Br$
d. $CH_3CH_2CH_3$

ANSWER: B
Bromine adds to each carbon atom across the double bond.
POINTS: 0 / 1
FEEDBACK:
REF: 448

___ 2. Which of the following is NOT a test for an alcohol?
a. reaction with sodium metal
b. reaction with a carboxylic acid
c. reaction with sodium carbonate
d. reaction with acidified potassium permanganate

ANSWER: C
Alcohols do not react with sodium carbonate.
POINTS: 0 / 1
FEEDBACK:
REF: 450

___ 3. An alcohol and carboxylic acid react to produce:
a. an ester.
b. a condensation polymer.
c. an amide.
d. an alkoxide.

ANSWER: A
The reaction between a carboxylic acid and an alcohol produces an ester.
POINTS: 0 / 1
FEEDBACK:
REF: 450

___ 4. A compound has the following chemical properties:
I a gas is produced on addition of sodium carbonate.
II a gas is produced on addition of sodium.
Which of the following could the compound be?
a. CH_3CH_2OH
b. HCOOH
c. CH_3CHO
d. CH_3COONa

ANSWER: B

The compound is a carboxylic acid as it produces carbon dioxide gas with a carbonate, and hydrogen gas with sodium.

POINTS: 0 / 1
FEEDBACK:
REF: 450

5. To determine the identity of three unknown organic liquids the following tests were conducted.

Liquid	Reaction with sodium metal	Reaction with bromine water in dichloromethane	Reaction with acidified potassium permanganate
I	No reaction	Decolourised	Decolourised
II	Bubbles produced	No reaction	Decolourised
III	Bubbles produced	No reaction	No reaction

Which of the following shows the correct identification of each of the liquids?
a. I – alcohol, II – carboxylic acid, III – alkene
b. I – alkene, II – carboxylic acid, III – alcohol
c. I- alkene , II – alcohol, III –carboxylic acid
d. I – alcohol, II – alkene, III –carboxylic acid

ANSWER: C
Alkene decolourises bromine and permanganate, alcohol produces hydrogen gas with sodium metal and decolourised permanganate, and carboxylic acid reacts with sodium metal to produce hydrogen gas.

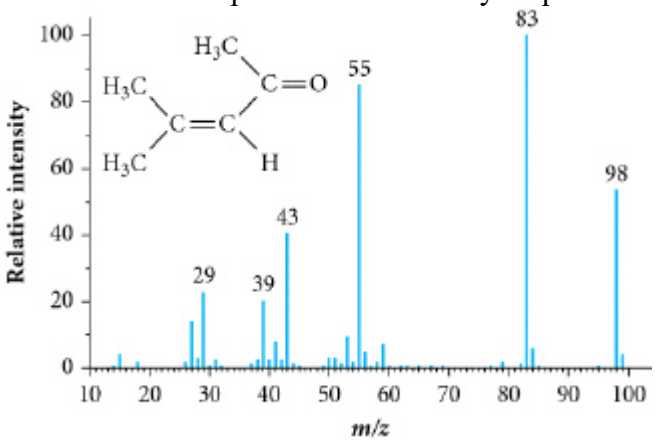
POINTS: 0 / 1
FEEDBACK:
REF: 450

6. In mass spectrometry:
a. only anions are detected.
b. the smaller cations are deflected more by the magnetic field.
c. anions, cations and neutral atoms produce individual peaks.
d. cations with a larger mass produce a higher peak.

ANSWER: B
Only cations are detected and those with less mass are deflected more than those with greater mass.

POINTS: 0 / 1
FEEDBACK:
REF: 454

7. Below is a mass spectrum for 4-methyl-3-pentene-2-one.



The base peak is found at:
a. 98 *m/z*.
b. 83 *m/z*.
c. 43 *m/z*.

d. 39 *m/z*.

ANSWER: B
The most abundant peal on the spectrum is the base peak.
POINTS: 0 / 1
FEEDBACK:
REF: 456

___ 8. Which relative mass could not be produced by the fragmentation of propene?
a. 30 *m/z*
b. 27 *m/z*
c. 15 *m/z*
d. 14 *m/z*

ANSWER: A
To produce a fragment of 30 m/z would require a fragment of 2 carbon and 3 hydrogens, which is not possible for propene.
POINTS: 0 / 1
FEEDBACK:
REF: 456

___ 9. The charge of most ions produced in the ionisation step of mass spectroscopy is:
a. –1
b. 0
c. +1
d. +2

ANSWER: C
Cations are produced in mass spectrometry and usually only one electron is knocked off, so the most common charge is +1.
POINTS: 0 / 1
FEEDBACK:
REF: 455

___ 10. A molecule with an unpaired electron is called:
a. an ion.
b. a radical.
c. a cation.
d. a radion.

ANSWER: B
A radical is a molecule with an unpaired electron and it may be neutral or positively charged.
POINTS: 0 / 1
FEEDBACK:
REF: 455

___ 11. How many H environments would exist for propanoic acid?
a. 1
b. 2
c. 3
d. 4

ANSWER: C
There are three H environments – one for the CH_3, one for the CH_2 and one for OH.
POINTS: 0 / 1
FEEDBACK:
REF: 463

REF: 463

___ 12. How many peaks will a signal from a CH_2 group on bromoethane split into on a high-resolution ^1H NMR spectrum?

a. 1
b. 2
c. 3
d. 4

ANSWER: D
There is a CH_3 group adjacent to the CH_2 so, according to the n+1 rule, the split will result in 3(H)+ 1 = 4 peaks.
POINTS: 0 / 1
FEEDBACK:
REF: 461

___ 13. How many C environments would exist for propanoic acid?

a. 1
b. 2
c. 3
d. 4

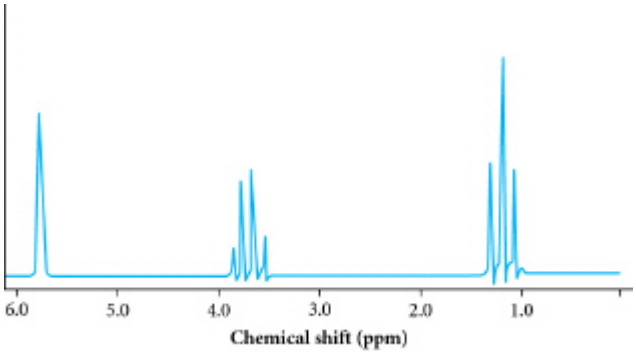
ANSWER: C
There are three C environments – one for the CH_3, one for the CH_2 and one for the COOH.
POINTS: 0 / 1
FEEDBACK:
REF: 468

___ 14. Which one of the following statements regarding ^{13}C NMR spectrum is incorrect?

a. The height of the peaks relates to the number of carbons in each environment.
b. The type of carbon is indicated by the chemical shift of the peak.
c. There is no splitting of the peaks.
d. The spectra do not provide as much detail as the ^1H NMR spectrum.

ANSWER: A
The height of the peak does not relate to the number of carbons in an environment.
POINTS: 0 / 1
FEEDBACK:
REF: 468

___ 15. A ^1H NMR of compound X is shown below.



Which of the following could be compound X?

a. ethyl ethanoate
b. propanoic acid
c. ethanol
d. propanone

d. propanone

ANSWER: C
Ethanol: CH_3CH_2OH, NMR has 3 peaks, relative intensity 3:2:1; Triplet, quartet and singlet with a shift around 0.9 ppm, 3.3 – 4.5 and 1–6
POINTS: 0 / 1
FEEDBACK:
REF: 466

___ 16. Which statement regarding the movement of atoms in a molecule is *false*?
a. A polyatomic molecule has both stretching and bending vibrations.
b. The vibrations in polyatomic and diatomic molecules will always be symmetrical.
c. When a molecule absorbs infrared energy the degree of bending will increase.
d. Diatomic molecules have only stretching vibration.

ANSWER: B
Vibrations may be symmetrical or asymmetrical in polyatomic molecules.
POINTS: 0 / 1
FEEDBACK:
REF: 469

___ 17. An infrared spectra can:
a. identify the presence of certain functional groups.
b. identify the absence of certain functional group.
c. be used to confirm the identity of an unknown sample by comparing it to a known sample.
d. perform all of the above.

ANSWER: D
Infrared spectroscopy can be used to identify the functional groups and unknown samples.
POINTS: 0 / 1
FEEDBACK:
REF: 469

___ 18. What wavenumbers correspond to the fingerprint region of an infrared spectrum?
a. $<1500\ cm^{-1}$
b. $1500–2000\ cm^{-1}$
c. $2000–3000\ cm^{-1}$
d. $>4000\ cm^{-1}$

ANSWER: A
The fingerprint region ($<1500\ cm^{-1}$) of a spectrum is unique to a compound so can be used to confirm the identity of an unknown by comparing it to a known sample.
POINTS: 0 / 1
FEEDBACK:
REF: 471

___ 19. UV-visible spectroscopy is based on:
a. electrons emitting a certain amount of energy all the time.
b. the colour of a molecule.
c. electrons in the molecule being excited to a higher energy level.
d. protons absorbing energy and moving faster.

ANSWER: C
When molecules are exposed to a specific wavelength of light that corresponds to an electron transition the electrons absorb the light energy and are excited to

a higher energy level.

POINTS: 0 / 1
FEEDBACK:
REF: 475

___ 20. Which analysis technique would be most suitable to identify the isotopes of an element?

a. NMR
b. UV-vis
c. Infrared spectroscopy
d. Mass spectroscopy

ANSWER: D
Mass spectroscopy measures the mass of a substance so if only one element is present in the sample it can be used to identify isotopes because they have different masses.

POINTS: 0 / 1
FEEDBACK:
REF: 480

Retake