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1. NMR spectroscopy is used for determining structure in which of the following materials?

- a) Radioactive materials
- b) Insoluble chemical compounds
- c) Liquids
- d) Gases

Answer: c

Explanation: NMR spectroscopy is used for determining structure in liquids. It is also used for determining the structure in soluble chemical compounds.

2. NMR is the study of absorption of _____ by nuclei in a magnetic field?

- a) Radioactive radiation
- b) IR radiation
- c) Radio frequency radiation
- d) Microwaves

Answer: c

Explanation: NMR is the study of absorption of radio frequency radiation by nuclei in a magnetic field. For a particular nucleus an NMR absorption spectrum may consist of one to several groups of absorption lines.

3. NMR spectrometer provides _____ and _____ method of determining structure in soluble chemical compounds.

- a) Accurate, destructive
- b) Accurate, non-destructive
- c) Inaccurate, destructive
- d) Inaccurate, non-destructive

Answer: b

Explanation: NMR spectrometer provides accurate and non-destructive method of determining structure in soluble chemical compounds. For a particular nucleus an NMR absorption spectrum may consist of one to several groups of absorption lines.

4. NMR spectroscopy indicates the chemical nature of the _____ and spatial positions of

- a) Electrons, Protons
- b) Neutrons, electrons
- c) Nuclei, electrons
- d) Nuclei, neighbouring nuclei

Answer: d

Explanation: NMR spectroscopy indicates the chemical nature of the nuclei and spatial positions of neighbouring nuclei. It is one of most powerful techniques for chemical analysis.

5. In NMR spectroscopy, the spinning nuclei in strong magnetic field must be irradiated by which of the following?

- a) Perpendicular and stronger field
- b) Perpendicular and weaker field
- c) Parallel and stronger field
- d) Parallel and weaker field

Answer: b

Explanation: In NMR spectroscopy, the spinning nuclei in strong magnetic field must be irradiated by a weaker field which is perpendicular to it. This permits the identification of atomic configurations in molecules.

6. Interaction between matter and electromagnetic radiation can be observed by subjecting a substance to magnetic fields in which of the following manner?

- a) Both fields should be stationary
- b) Both fields should be varying
- c) One field should be stationary and the other should be varying
- d) It must be subjected to only one field

Answer: c

Explanation: Interaction between matter and electromagnetic radiation can be observed by subjecting a substance to two magnetic fields. One magnetic field must be stationary and the other field must be varying at some radio frequency.

7. When energy is absorbed by the sample, the absorption can be observed as a change in signal developed by which of the following components?

- a) Amplifier
- b) Photodetector
- c) GM counter
- d) Radiofrequency detector

Answer: d

Explanation: When energy is absorbed by the sample, the absorption can be observed as a change in signal developed by radiofrequency detector. It is then given to an amplifier.

8. Which of the following are considered to be the lowest form of Electromagnetic radiation?

- a) IR radiation
- b) Micro waves
- c) UV radiation
- d) Radio waves

Answer: d

Explanation: Radio waves are considered to be the lowest form of Electromagnetic radiation. NMR uses radio frequency radiation for detection of structure of substances.

9. The amount of energy available in radio frequency radiation is sufficient for which of the following?

- a) Excite an atom
- b) Vibrate an atom
- c) Vibrate a molecule
- d) Affect the nuclear spin of an atom

Answer: d

Explanation: The amount of energy available in radio frequency radiation is sufficient for affecting the nuclear spin of an atom. It constitute the most fundamental part of spectroscopy.

10. Nuclei having either the number of protons or neutrons as odd have _____ spin.

- a) Integral spin
- b) Half integral spin
- c) Zero spin
- d) Positive spin

Answer: b

Explanation: Nuclei having either the number of protons or neutrons as odd have half-integral spin. Examples are H1 and B11.