

Energy and Discovery of X-rays

Multiple Choice

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

- _____ 1. Matter is measured in _____.
a. kilograms
b. joules
c. electron volts
d. rems
- _____ 2. Atoms and molecules are the fundamental building blocks of _____.
a. energy
b. radiation
c. matter
d. gravity
- _____ 3. Ice and steam are examples of two forms of _____.
a. matter
b. radiation
c. energy
d. work
- _____ 4. Radio waves, light, and x-rays are all examples of _____ energy.
a. nuclear
b. thermal
c. electrical
d. electromagnetic
- _____ 5. A moving object has _____ energy.
a. potential
b. kinetic
c. nuclear
d. electromagnetic
- _____ 6. What is the removal of an electron from an atom called?
a. ionization
b. pair production
c. irradiation
d. electricity
- _____ 7. Ionizing radiation is capable of removing _____ from atoms as it passes through the matter.
a. neutrons
b. protons
c. electrons
d. ions
- _____ 8. The energy of x-rays is _____.

- a. thermal
- b. potential
- c. kinetic
- d. electromagnetic

- ___ 9. The smallest quantity of any type of electromagnetic radiation is a(n) _____.
a. photon
b. electron
c. neutrino
d. quark
- ___ 10. What is the velocity of all electromagnetic radiation?
a. 8×10^3 m/s
b. 2×10^8 m/s
c. 3×10^8 m/s
d. 4×10^3 m/s
- ___ 11. What type of tube was Roentgen working with in his lab when x-rays were discovered?
a. Crookes tube
b. Fluorescent tube
c. High-vacuum tube
d. Wurzburg tube
- ___ 12. The letter “x” in x-ray is the symbol for:
a. electricity.
b. the unknown.
c. penetrating.
d. discovery.
- ___ 13. The speed of light is:
a. 3×10^8 meters per second.
b. 3×10^8 miles per second.
c. 186,000 miles per second.
d. a and c.
- ___ 14. X-rays are invisible.
a. True
b. False
- ___ 15. X-rays carry a negative charge that causes ionization.
a. True
b. False
- ___ 16. X-ray photons travel at the speed of light in a vacuum.
a. True
b. False
- ___ 17. X-ray photons are capable of traveling around corners.
a. True

- b. False
- ___ 18. Chemical changes may occur as a result of exposure to ionizing radiation.
- a. True
 - b. False
- ___ 19. The “building blocks” of all matter are called:
- a. electrons.
 - b. atoms.
 - c. protons.
 - d. neutrons.
- ___ 20. The quantity of matter that makes up any physical object is called its:
- a. chemical identity.
 - b. nucleus.
 - c. atomic number.
 - d. mass.
- ___ 21. Which of the following particles are located in an orbit around the nucleus of an atom?
- a. Protons
 - b. Electrons
 - c. Neutrons
 - d. Positrons
- ___ 22. When an electron is removed from an atom, the atom is said to be:
- a. radioactive.
 - b. a nuclide.
 - c. unstable.
 - d. ionized.
- ___ 23. X-rays consist of:
- a. tungsten atoms.
 - b. electricity.
 - c. electromagnetic energy.
 - d. fast-moving electrons.
- ___ 24. The smallest possible unit of electromagnetic energy is the:
- a. photon.
 - b. electron.
 - c. nucleus.
 - d. atom.
- ___ 25. When an atom gains or loses an electron, the process is called:
- a. resistance.
 - b. potential difference.
 - c. electrification.
 - d. ionization.

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Answer Section

MULTIPLE CHOICE

1. ANS: A

Matter is measured in kilograms

PTS: 1 DIF: Easy REF: page 3

OBJ: Recognize the unit of measurement for matter.

2. ANS: C

Atoms and molecules are the fundamental building blocks of matter.

PTS: 1 DIF: Moderate REF: page 3

OBJ: List the fundamental building blocks of matter.

3. ANS: A

Ice and steam are examples of two forms of matter.

PTS: 1 DIF: Difficult REF: page 4 OBJ: Describe states of matter.

4. ANS: D

Electromagnetic energy includes radio waves, light, and x-rays as well as other parts of the spectrum.

PTS: 1 DIF: Difficult REF: page 4

OBJ: List types of electromagnetic energy.

5. ANS: B

A moving object has kinetic energy.

PTS: 1 DIF: Moderate REF: page 4 OBJ: Identify various forms of energy.

6. ANS: A

The removal of an electron from an atom is called ionization.

PTS: 1 DIF: Moderate REF: page 5 OBJ: Understand ionization of matter.

7. ANS: C

Ionizing radiation is capable of removing electrons from atoms as it passes through the matter.

PTS: 1 DIF: Moderate REF: page 5

OBJ: Describe the process of ionization by ionizing radiation.

8. ANS: D

X-rays are a form of electromagnetic energy.

PTS: 1 DIF: Difficult REF: page 5

OBJ: List the category of energy of x-rays.

9. ANS: A

The smallest quantity of any type of electromagnetic radiation is a photon.

PTS: 1 DIF: Easy REF: page 45 OBJ: Define photons.

10. ANS: C

The velocity of all electromagnetic radiation is 3×10^8 m/s.

PTS: 1 DIF: Moderate REF: page 45

OBJ: State the velocity of all electromagnetic radiation.

11. ANS: A

Roentgen was working with a low-vacuum tube known as a Crookes tube.

PTS: 1

12. ANS: B

The letter “x” represents the mathematical symbol of the unknown.

PTS: 1

13. ANS: D

The speed of light can be described as either 3×10^8 m/sec or 186,000 miles/sec.

PTS: 1

14. ANS: A

A characteristic of x-rays is that they are invisible.

PTS: 1

15. ANS: B

X-rays are electrically neutral.

PTS: 1

16. ANS: A

In a vacuum x-rays will travel at the speed of light.

PTS: 1

17. ANS: B

X-rays travel in straight lines, so they are unable to travel around corners.

PTS: 1

18. ANS: A

Chemical changes, such as in radiographic or photographic film, occur as a result of exposure to ionizing radiation.

PTS: 1

19. ANS: B

PTS: 1

REF: Page 42

20. ANS: D

PTS: 1

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21. ANS: B

PTS: 1

REF: Page 42

22. ANS: D

PTS: 1

REF: Page 43

23. ANS: C

PTS: 1

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24. ANS: A

PTS: 1

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25. ANS: D

PTS: 1

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