

## Structure of Matter

15. Match the charge with the particle:

- |    |          |    |             |
|----|----------|----|-------------|
| A. | Electron | a. | +1          |
| B. | Positron | b. | -1          |
| C. | Proton   | c. | 0 (neutral) |
| D. | Neutron  |    |             |
| E. | Photon   |    |             |

16. Isobars are nuclides that have the same:

- A. Number of protons
- B. Atomic number
- C. Mass number
- D. Number of neutrons

17. Which of the following nuclear transitions produces only photon radiation:

- A. Isomeric
- B. Electron capture
- C. Isobaric
- D. Isotopic

18. Which of these transitions produces electrons:

- A. Isobaric
- B. Auger
- D. Internal conversion
- E. All of the above

19. What determines the binding energy of an electron:

- A. The physical density of the material
- B. The shell (K, L, etc.) location of the electrons and the atomic number of the element
- C. The thickness of the material
- D. The speed of the electron in the orbit

20. Match the following symbols with their corresponding parameters:

- |    |    |    |                   |
|----|----|----|-------------------|
| A. | Na | a. | Plank's constant  |
| B. | A  | b. | Mass number       |
| C. | Z  | c. | Atomic number     |
| D. | h  | d. | Avogadro's number |

21. The mass of an electron at rest is:

- A. 1.02 MeV
- B. 0.511 MeV
- C. 9.81 MeV
- D. 5.11 MeV

22. One atomic mass unit is the same as:

- A.  $1.66 \times 10^{-27}$  Kg
- B. 1/12 the mass of a  $^{12}\text{C}_6$  nucleus
- C. 931 MeV
- D. All of the above

23. The number of atoms in one gram is equal to:

- A. The atomic weight divided by the atomic mass
- B. Avogadro's number divided by atomic weight of the atom
- C. Avogadro's number divided by the density of the material
- D. The atomic weight divided by Avogadro's number

24. The binding energy of the nucleus is the:

- A. Force of repulsion between the electrons of the atoms
- B. Force of attraction between the protons and electrons of the atom
- C. Energy needed to keep the nuclear particles together
- D. Force of attraction between atoms

25. The mass of an electron is:

- A. The same as that of a proton
- B. Half of the proton's mass
- C. The same as that of a neutron
- D. Much smaller than the mass of a neutron

26. Which of the following does not ionize directly:

- A. Positron
- B. Neutron
- C. Alpha particle
- D. Electron
- E. Proton

27. Approximately how heavy is a neutron compared to an electron:

- A. 10 : 1
- B. 100 : 1
- C. 1000 : 1
- D. 2000 : 1

28. The atomic mass number ( $A$ ) is equal to the:

- A. Number of neutrons
- B. Number of electrons and protons
- C. Number of neutrons, electrons and protons
- D. Mass of electrons minus their binding energies
- E. Number of nucleons (protons and neutrons)

29. The energy equivalent of an atomic mass unit is approximately:

- A. 1 keV
- B. 10 keV
- C. 100 MeV
- D. 1000 MeV

30. The binding energy of an electron is:

- A. Highest for the most external shell
- B. Highest for the inner most shell
- C. Highest for a free electron
- D. Highest for the fastest moving electron

31. Ionization implies:

- A. An excited state of the atom
- B. The production of x-rays
- C. The removal of an electron from the atom
- D. A neutral state of the atom

32. A deuteron ( ${}^2\text{H}$ ) is the nucleus of an isotope of hydrogen. Which of the following is true:

- A. It has a mass number of 2
- B. It has an atomic number of 2
- C. It has a positive charge of 2
- D. It has an energy of 2 MeV

33. In order for a photon to ionize an atom, its energy must be:

- A. Greater than the binding energy of an electron in the atom
- B. Less than the binding energy of an electron in the atom
- C. Equal to the binding energy of an electron in the atom
- D. None of the above

34. An atom is neutral if the number of its electrons is equal to its:

- A. Number of protons
- B. Number of nucleons
- C. Atomic weight
- D. None of the above