Discovery and Properties of anode, cathode rays neutron and Nuclear structure

22. (d) 10^{-8} cm

Explanation:
Atoms are extremely small, but their size is much larger than the nucleus. The typical radius of an atom is about 1 A˚ =10^{-10} m = 10^{-8} cm.

23. (c) No charge

Explanation:
Neutrons are neutral particles found in the nucleus. They do **not** carry any electric charge.

24. (b) No charge and a mass of 1 unit

Explanation:

Charge: 0

Mass: approximately 1 atomic mass unit (u), similar to a proton.

25. (d) Mass and charge both

`Explanation:
Cathode rays are streams of **electrons**, which have **mass** (≈ 9.11×10^{-31} kg) and **negative charge**.

26. (c) Size of nucleus is measured in *Fermi* (1 Fermi = $10^{-15}m$).

27. (b) A molecule of an element is a incorrect statement. The correct statement is "an element of a molecule".

28. (d) Bohr – Isotope

Explanation:

Rutherford → Proton: Correct, he discovered the nucleus and proposed the proton as a positively charged particle.

J.J. Thomson → Electron: Correct, he discovered the electron in 1897.

J.H. Chadwick → Neutron: Correct, he discovered the neutron in 1932.

Bohr → Isotope: Incorrect, Bohr is famous for the **Bohr model of the atom**, not isotopes. The concept of isotopes was introduced by **Frederick Soddy**.

29. (c) Proton is represented by *p* having charge +1 discovered in 1988 by Goldstein.

31. (b) The nature of anode rays depends upon the nature of residual gas.

30. (a) **quantization of charge**.

32. (d) H^+ (proton) will have very large hydration energy due to its very small ionic size

Hydration energy $\propto \frac{1}{\text{Size}}$

33. (b) Mass of a proton $= 1.673 \times 10^{-24} g$

$\therefore$ Mass of one mole of proton

$= 9.1 \times 10^{-24} \times 6.02 \times 10^{23} = 10.07 \times 10^{-1} = 1.008 g$

Mass of a electron $= 9.1 \times 10^{-28} g$

$\therefore$ Mass of one mole of electron
$= 9.1 \times 10^{-28} \times 6.02 \times 10^{23} = 54.78 \times 10^{-5} g = 0.55 mg.$

34. (c) 10−1010^{-10}10−10 m

Explanation:

The electron orbits around the nucleus at a typical distance called the **atomic radius**.

This distance is on the order of **1 Ångström**, which is 1 A˚=10^{-10} m

Distances like 10^{-6}m are far too large, and 10^{-15} m corresponds to **nuclear size**, not electron orbit.

35. (c) One mole of electron = 6.023×10^{23} electron
Mass of one electron = 9.1×10^{-28} *gm*
Mass of one mole of electrons
$= 6.023 \times 10^{23} \times 9.1 \times 10^{-28} gm = 5.48 \times 10^{-4} gm$
$= 5.48 \times 10^{-4} \times 1000 mg = 0.548 gm \approx 0.55 mg.$

36. (a) Charge on proton $= +1$ unit, charge on α particle = + 2 units, 2 : 1.

37. (b) $m_p/m_e \simeq 1837 \simeq 1.8 \times 10^3$.

38. (a) Splitting of signals is caused by protons attached to adjacent carbon provided these are not equivalent to the absorbing proton.

39. (d) Nucleus consists of proton and neutron both are called as nucleon.

40. (c) Positron $(+1e^0)$ has the same mass as that of an electron $(-1e^0)$.

41. (c) Electron $\frac{1}{1837}$ time lighter than proton so their mass ratio will be 1 : 1837