

EXERCISE II (JEE ADVANCED)

Section A (Only one Correct)

- A sample of clay contains 50% silica and 10% water. The sample is partially dried by which it loses 8 g water. If the percentage of silica in the partially dried clay is 52, what is the percentage of water in the partially dried clay?
(a) 2.0% (b) 6.4%
(c) 10.4% (d) 2.4%
- In the atomic weight determination, Dalton suggested the formula of water as HO and the composition of water as hydrogen = 12.5% and oxygen = 87.5%, by weight. What should be the atomic weight of oxygen on H-scale, on the basis of this information?
(a) 16 (b) 8
(c) 14 (d) 7
- The mercury content of a stream was believed to be above the minimum considered safe limit (1 part per billion, by mass). An analysis indicated that the concentration was 1.68 parts per billion. How many Hg atoms are present in 15 L of water, the density of which is 0.998 g/ml. (Hg = 200)
(a) 7.57×10^{13}
(b) 7.57×10^{19}
(c) 7.57×10^{16}
(d) 5.37×10^{16}
- Assume that sodium atoms are spheres of radius 0.2 nm and that they are lined up side by side. How many miles, in length, is the line of atoms present in a 1.15 mg sample of sodium? ($N_A = 6 \times 10^{23}$)
(a) 1.2×10^{10} (b) 1.2×10^8
(c) 7.5×10^8 (d) 7.5×10^6
- The density of gold is 19.7 g/cm³. The radius of gold atom is [Au = 197, $N_A = 6 \times 10^{23}$, $(10\pi)^{1/3} = 3.15$]
(a) 1.587×10^{-8} m
(b) 1.587×10^{-9} m
(c) 1.587×10^{-10} m
(d) 1.587×10^{-12} m
- The average density of the universe as a whole is estimated as 3×10^{-29} g/ml. If we assume that the entire mass is only H atoms, what is the average volume of space that contains one H atom?
(a) 111.11 l
(b) 1.8×10^{-5} l
(c) 55.56 l
(d) 3.6×10^{-5} l
- The waste of nuclear power plant contains C¹² and C¹⁴ in the ratio of 4:1 by moles. What is the molecular mass of methane gas produced from this disposed waste? Given that the natural abundance of C¹² and C¹⁴ are 98% and 2%, respectively.
(a) 15.998 (b) 16.0053
(c) 16 (d) 16.4
- Two isotopes of an element Q are Q⁹⁷ (23.4% abundance) and Q⁹⁴ (76.6% abundance). Q⁹⁷ is 8.082 times heavier than C¹² and Q⁹⁴ is 7.833 times heavier than C¹². What is the average atomic weight of the element Q?
(a) 94.702 (b) 78.913
(c) 96.298 (d) 94.695
- The O¹⁸/O¹⁶ ratio in some meteorites is greater than that used to calculate the average atomic mass of oxygen on earth. The average mass of an atom of oxygen in these meteorites is _____ that of a terrestrial oxygen atom?
(a) equal to
(b) greater than
(c) less than
(d) none of these