

Basic definitions

1. Which of the following are isotopes :

- (i) Atom, whose nucleus contains $20p + 15n$ (ii) Atom, whose nucleus contains $20p + 17n$
 (iii) Atom, whose nucleus contains $18p + 22n$ (iv) Atom, whose nucleus contains $18p + 21n$
 (A) (i) and (iii) (B) (i) and (iv) (C) (ii) and (iii) (D) (iii) and (iv)

2. Which of the following are isobars :

- (i) Atom, whose nucleus contains $20p + 15n$ (ii) Atom, whose nucleus contains $20p + 20n$
 (iii) Atom, whose nucleus contains $18p + 17n$ (iv) Atom, whose nucleus contains $18p + 22n$
 (A) (i) and (iv) (B) (ii) and (iii) (C) (iii) and (iv) (D) (i) and (iii)

3. Which of the following pairs contain isoelectronic species :

- (A) CO_3^{2-} , NO_3^- (B) SO_4^{2-} , PO_4^{3-} (C) CO_2 , N_2O (D) N^{3-} , Al^{3+}

4. The atom A, B, C have the configuration

$A \rightarrow [Z(90) + n(146)]$, $B \rightarrow [Z(92) + n(146)]$, $C \rightarrow [Z(90) + n(148)]$ So that :-

- (a) A and C - Isotones (b) A and C - Isotopes (c) A and B - Isobars (d) B and C - Isobars
 (e) B and C - Isotopes; The wrong statement's are:-

- (A) a and c (B) c, d and e (C) a, c, and d (D) a, c and e

5. Atoms ${}_6\text{C}^{13}$ and ${}_8\text{O}^{17}$ are related to each other as

- (A) Isotone's (B) Isoelectronic (C) Isodiapher's (D) Isoster's

6. Which one of the following sets of ions represents the collection of isoelectronic species ?

- (A) Na^+ , Mg^{2+} , Al^{3+} , Cl^- (B) Na^+ , Ca^{2+} , Sc^{3+} , F^- (C) K^+ , Cl^- , Mg^{2+} , Sc^{3+} (D) K^+ , Ca^{2+} , Sc^{3+} , Cl^-

7. (i) ${}_{26}\text{Fe}^{54}$, ${}_{26}\text{Fe}^{56}$, ${}_{26}\text{Fe}^{57}$, ${}_{26}\text{Fe}^{58}$

(a) Isotopes

(ii) ${}_1\text{H}^3$, ${}_2\text{He}^3$

(b) Isotones

(iii) ${}_{32}\text{Ge}^{76}$, ${}_{33}\text{As}^{77}$

(c) Isodiaphers

(iv) ${}_{92}\text{U}^{235}$, ${}_{90}\text{Th}^{231}$

(d) Isobars

(v) ${}_1\text{H}^1$, ${}_1\text{D}^2$, ${}_1\text{T}^3$

Match the above correct terms:-

- (A) [(i), - a], [(ii) - d], [(iii) - b], [(iv) - c], [(v) - a] (B) [(i) - a] [(ii) - d], [(iii) - d] [(iv) - c] [v - a]
 (C) [v - a] [(iv) - c]. [(iii) - d] [(ii) - b] [(i) - a] (D) None of them

8. If the atomic number (Z) and mass number (A) of an element X are related by the equation : $A + Z = 46$ and the total number of neutrons in one atom of X is 16, then the total number of protons and electrons in one atom of element X = 'a'. Find value of 'a'.

9. If an atom of an element Y contains equal number of protons, neutrons and electrons, and its atomic number (Z) and mass number (A) are related as : $2A + 3Z = 140$, then the total number of nucleons present in one atom of element Y = 'b'. Find value of 'b'

10. Match the following : (Mass numbers : H = 1, C = 12, N = 14, O = 16)

Column-I

(A) CH_4

(B) NO^+

(C) CN^-

(D) H_2O

Column-II

(p) Species contain a total of 10 electrons.

(q) Total number of protons is greater than or equal to 13.

(r) Total number of neutrons is less than or equal to 9.

(s) Species is isoelectronic with CO.

Cathode and Anode Rays

11. Which is not true with respect to cathode rays :
- (A) Cathode rays consist of fast moving electrons.
 - (B) For production of Cathode rays in a discharge tube, the gas filled is at a low pressure.
 - (C) For production of Cathode rays in a discharge tube, the voltage applied across the electrodes should be high.
 - (D) None of these
12. Select the correct statement :
- (A) Cathode rays have charge only, no mass.
 - (B) Cathode move with same speed as that of light.
 - (C) The magnitude of e/m ratio for Cathode rays is 1.76×10^{11} C/g.
 - (D) Cathode rays are deflected by electric and magnetic field.
13. Which of the following statements is/are INCORRECT regarding anode rays :
- (A) Anode rays consist of fast moving protons.
 - (B) Anode rays are produced by the ejection of protons from the anode material.
 - (C) Both (A) & (B)
 - (D) None of these.
14. Select the correct statement(s) :
- (A) Anode rays have charge as well as mass.
 - (B) Anode rays are deflected by electric and magnetic field.
 - (C) Anode rays are also known as Positive rays or Canal rays.
 - (D) All of these.
15. The e/m ratio for Anode rays :
- (A) varies with the element forming the anode in the discharge tube.
 - (B) varies with the gas in the discharge tube.
 - (C) is constant.
 - (D) Both (A) & (B).
16. The highest value for e/m for anode rays has been observed when the discharge tube is filled with _____ gas:
- (A) nitrogen (B) oxygen (C) hydrogen (D) helium
17. Which of the following pairs do not have identical values of e/m :
- (A) A proton and a neutron (B) A proton and a Deuterium nucleus
 - (C) A Deuterium nucleus and an α -particle (D) An electron and α -particle
18. How many moles of protons will have total charge equal to about 4825 Coulombs :
- (A) 0.02 mole (B) 0.5 mole (C) 0.05 mole (D) 0.2 mole
19. The ratio of the e/m values of a proton and an α -particle is :
- (A) 2 : 1 (B) 1 : 1 (C) 1 : 2 (D) 1 : 4
20. Which of the following is an arrangement of increasing value of e/m (wrt magnitude only) :
- (A) $n < \alpha < p < e$ (B) $e < p < \alpha < n$ (C) $n < p < e < \alpha$ (D) $n < p < \alpha < e$

Home Work : NCERT Exercise 2.1 To 2.4 ; 2.22 & 2.26

Answers

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1. (D) 2. (D) 3. (ABCD) 4. (AD) 5. (C) 6. 7. (A) 8. (30) 9. (40)
10. A-PR, B-QS, C-QS, D-PR 11. (D) 12. (D) 13. (B) 14. (D) 15. (B) 16. (C)
17. (ABD) 18. (C) 19. (A) 20. (A)