CHEMISTRY

BOOKS - NTA MOCK TESTS

SOLID STATE TEST

Multiple Choice Questions

1. CaBr has bcc structure edge length 4.3Å. The shortest inter ionic distance in between Cs^+ and Br^- is

A. 4. 3Å

B. 7. 44Å

C. 1. 86Å

D. 3. 72Å

Answer: D

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2. A metallic elemnt crystallise into lattice having a layering sequence of ABABAB. Any packing of sphere leaves out voids in the

lattice. Determine what percentage by volume of this lattice is empty space.

A. 26 %

B. 56.2 %

C. 12. 4 %

D. 74.0 %

Answer: A

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3. In face-centred cubic (FCC) and body centred cubic (BCC), whose unit cell lengths are 3.5 and 3.0 Å respectively, a metal crystallises into two cubic phases. What is the ratio of densities of FCC and BCC?
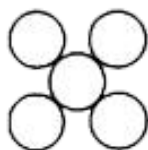
A. 1. 259

B. 3. 0
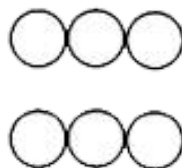
C. 12.5

D. 0. 59

Answer: A

4. The figures given below show the location of atoms in three crystallographic planes in a FCC lattice.

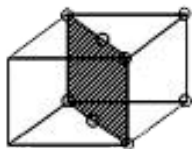
(a)   (b)   (c)

The planes in the unit cell have been highlighted in the diagram below choose the

correct option.

(I)   (II)   (III)

A. $a - l, b - lll, c - ll$

B. $a - ll, b - lll, c - l$

C. $a - lll, b - ll, c - l$

D. $a - l, b - ll, c - lll$

Answer: A

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5. In NaCl crystal, the nature of the defect is:

A. Interstitial defect

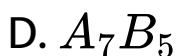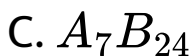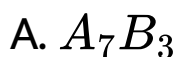B. Schottky defect

C. Frenkel defect

D. None of these

Answer: B

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6. In face centred cubic arrangement of A and B atoms, A atoms are at the corners of the unit cell and B atoms at the face centres. One of the A atoms is missing from one corner in the unit cell. The simplest formula of the compound is
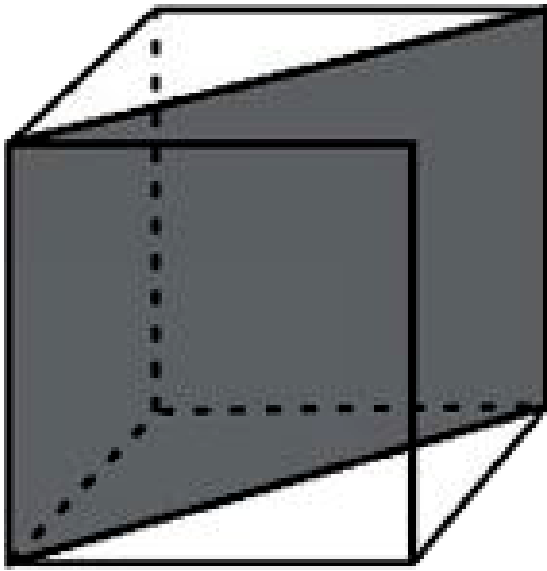
   A. A_7B_3

   B. AB_3

   C. A_7B_{24}

   D. A_7B_5

Answer: C
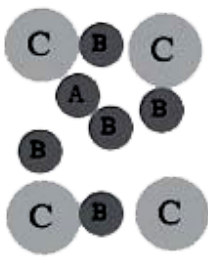
7. In a hypothetical solid, C atoms are found to form cubical close-packed lattice. A atoms occupy all tetrahedral voids and B atoms occupy all octahedral voids.

A and B atoms are of appropriate size, so that there is no distortion in the CCP lattice of C atoms. Now, if a plane as shown in the following figure is cut, then the cross section of this plane will look like

A.
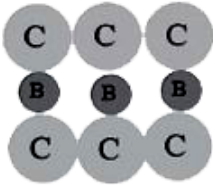
B.
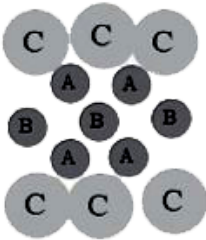
C.

D. None of these

Answer: D

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8. In normal spinel structures $MgAl_2, O_4,$ the precentage of tetrahedral void occupied is

A. 12. 5 %

B. 25 %

C. 50 %

D. None of these

Answer: A

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9. The appearance of colour in solid alkali metal halides is generally due to the

A. Schottky defect.

B. interstitial position.

C. Frenkel defect

D. F-centres.

Answer: D

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10. In the given body- centred cubic AB, AC, and

AA' are :
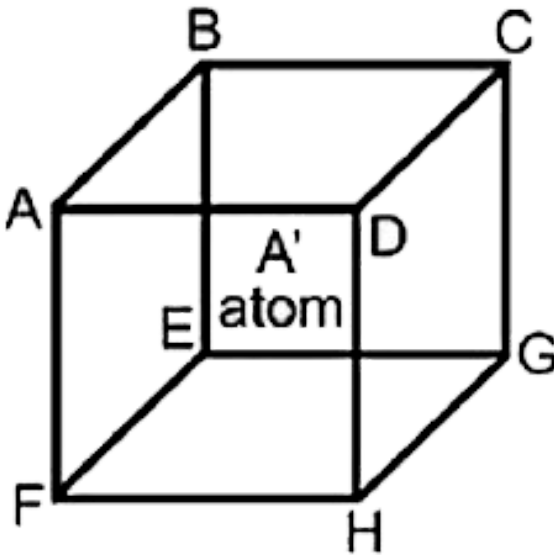
A. a, $\sqrt{2}a$, $\dfrac{\sqrt{3}a}{2}$

B. a, $\dfrac{\sqrt{3}a}{2}$, $\sqrt{2}a$

C. $\dfrac{\sqrt{3}a}{2}$, $\sqrt{2}a$, a

D. $a, \dfrac{a}{\sqrt{2}}, \dfrac{\sqrt{3}a}{2}$

Answer: A

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11. The packing efficiency of the two-dimensional square unit cell shown below is

|←—L—→|
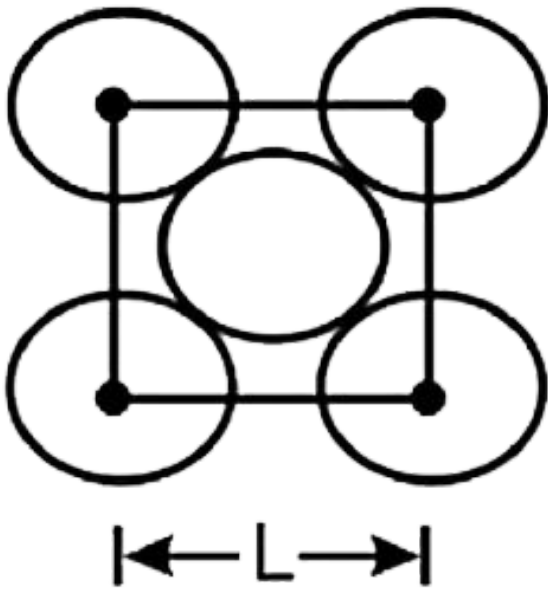
A. 39.27 %

B. 68.02 %

C. 74.05 %

D. 78.54 %

Answer: D

12. Oxygen atom forms FCC unit cell with 'A' atoms occupying all tetrahedral voids and 'B' atoms occupying all octahedral voids. If atoms are removed from two of the body diagonals then determine the formula of resultant compound formed.

A. $A_4B_4O_7$

B. $A_8B_6O_7$

C. $A_8B_8O_7$

D. $A_6B_8O_6$
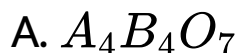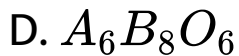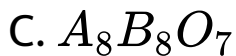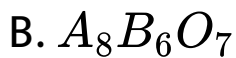
Answer: B

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13. Which of the following is not correct for ionic crystals?

A. All are electrolyte

B. Exhibit the property of isomorphism

C. They process high melting point and

boiling point

D. Exhibit directional properties of the

bond

Answer: D

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14. Ferrous oxide has a cubic structure and each edge of the unit cell is 5.0 Å. Assuming density of the oxide as $4.0 gcm^2$ then the number of Fe^{2+} and O^{2-} ions present in each unit cell will be

A. Two Fe^{2+} and four O^{2-}

B. Three $Fe^{2+0 \ and}$ three O^{2-}

C. Four Fe^{2+} and two O^{2-}

D. Four Fe^{2+} and four O^{2-}

Answer: D

15. 'C'represent the height of the HCP unit cell and 'a' represent edge length of the hexagonal surface of the HCP unit cell. What is the value of C/a?

A. $\sqrt{\dfrac{2}{3}}$

B. $\sqrt{\dfrac{8}{3}}$

C. $\sqrt{\dfrac{32}{3}}$

D. $\sqrt{\dfrac{3}{2}}$

Answer: B

16. With $11.35 g/cm^3$ density, a group IV A element crystallises in a face centred cubic lattice, whose unit cell edge length being 4.95 Å. Calculate its atomic mass.

A. $207.2 gmol^{-1}$

B. $180 gmol^{-1}$

C. $109.9 gmol^{-1}$

D. $280. 8 gmol^{-1}$

Answer: A

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17. A compound formed by elements A and B crystallize in a cubic structure, where atoms of A are at the corners of a cube and atoms of B are at the face centre of a cube. What is the formula of the compound formed?

A. AB_3

B. AB_2

C. AB_4

D. None of these

Answer: A

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18. Consider a binary solid $(A^+ B^-)$ of rock salt structure with an edge length of 400 pm. If the radius of cation is 75 pm, then what is the radius of anion?

A. 100 pm

B. 125 pm

C. 250 pm

D. 325 pm

Answer: B

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19. Na and Mg crystallize in BCC and FCC crystals, respectively. How many atoms of Na

and Mg are present in the unit cell of their respective crystals?

A. 4 and 2

B. 9 and 14

C. 14 and 19

D. 2 and 4

Answer: D

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20. The co-ordination number of metal crystallizing in a hexagonal close packed structure is

A. 12

B. 4

C. 8

D. 6

Answer: A

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21. The unite with crystallographic dimensions

$,a = b \neq c$ is

$\alpha = \beta = \gamma = 90°$

   A. Cuibic

   B. Tatragonal

   C. Monoclinic

   D. Hexagonal

Answer: B

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22. A solid has a bcc structure. If the distance of closest approach between the two atoms is 1. 73Å. The edge length of the cell is :

A. 200 pm

B. $\sqrt{\dfrac{3}{2}}$ pm

C. 142.2 pm

D. $\sqrt{2}$ pm

Answer: A

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23. For an ionic crystal of the general formula AX and coordination, the number is 6:6. The value of the radius ratio will be

A. Greater than 0.732.

B. In between 0.73 and 0.41.

C. In between 0.414 and 0.22.

D. Less than 0.22.

Answer: B

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24. How many octahedral and tetrahedral holes are present per unit cell in a face centred cubic arrangement of atoms?

A. 8, 4

B. 1, 2

C. 4, 8

D. 2,1

Answer: C

25. The density of KBr is $2.75 gcm^{-3}$, length of the unit cell is 654 pm. K = 39, Br = 80, then what can be true about the predicted nature of the solid? (Given: $N_A = 6.023 \times 10^{23}$)

A. A Solid has face centred cubic system with co-ordination number of ions= 6:6.

B. Solid has simple cubic system with co-ordination number = 8

C. Solid has face centred cubic system with co-ordination number =12

D. None of the above

Answer: A

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26. The radius ratio of KF is 0.98. The structure

of KF is of the type

A. NaCl

B. ZnS

C. CsCl

D. raphite

Answer: C

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27. The void space in a primitive unit cell is :

A. 48% void space

B. 24% void space

C. 96% void space

D. 50% void space

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28. The molecular formula of a non stoichimetrix tin oxide containing Sn (ll) and Sn (lV) ions is $Sn_{444}O_8$.

Therefore, the molar ratio of Sn (ll) to Sn (IV) is approximately

A. $1:8$

B. $1:6$

C. $1:4$

D. $1:1$

Answer: C

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29. How many units of NaCl is present per unit cell of NaCl ?
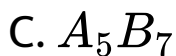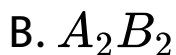
A. 4

B. 6

C. 2

D. 8

Answer: A

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30. A body centre cubic lattice is made up of two different types of atoms A and B. Atom A occupies the body centre and B occupying the corner positions. One of the corners is left

unoccupied per unit cell. Empirical formula of

such a solid is

A. AB

B. A_2B_2

C. A_5B_7

D. A_8B_7

Answer: D

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