Unit 9 - Imperfections in Solids

Assignment-8

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-10-23, 23:59 IST.

1) What is/are diffraction condition(s) for a face centered cubic (FCC) lattice? *1 point*

- all (h, k, l) are odd
- all (h, k, l) are even
- h + k + l = even integers
- h + k + l = odd integers

No, the answer is incorrect.
Score: 0
Accepted Answers:
all (h, k, l) are odd
all (h, k, l) are even

2) In crystalline materials, peak broadening in XRD spectra is die to: *1 point*

- coarse grains
- fine grains
- uniform strain
- non-uniform strain

No, the answer is incorrect.
Score: 0
Accepted Answers:
fine grains
non-uniform strain

3) The structure factor and extinction conditions for the ordered form of Cu-Zn (50%Cu-50%Zn) is *1 point*

- ($f_{Cu} + f_{Zn}$) for h+k+l = even and ($f_{Cu} - f_{Zn}$) for h+k+l = odd
- ($f_{Cu} + f_{Zn}$) for h+k+l = even and 0 for h+k+l = odd
- ($f_{Cu} + f_{Zn}$) for hkl being unmixed (all even or all odd) and ($f_{cu} – f_{zn}$) for hkl being mixed
- ($f_{Cu} + f_{Zn}$) for hkl being unmixed (all even or all odd) and 0 for hkl being mixed

No, the answer is incorrect.
Score: 0
Accepted Answers:
($f_{Cu} + f_{Zn}$) for h+k+l = even and ($f_{Cu} - f_{Zn}$) for h+k+l = odd

4) The intensity of diffracted beam (I) for a crystalline material is proportional to the structure factor (F) as: *1 point*

- $F^{0.5}$
- $F^{1.0}$
- $F^{1.5}$
- $F^{2.0}$

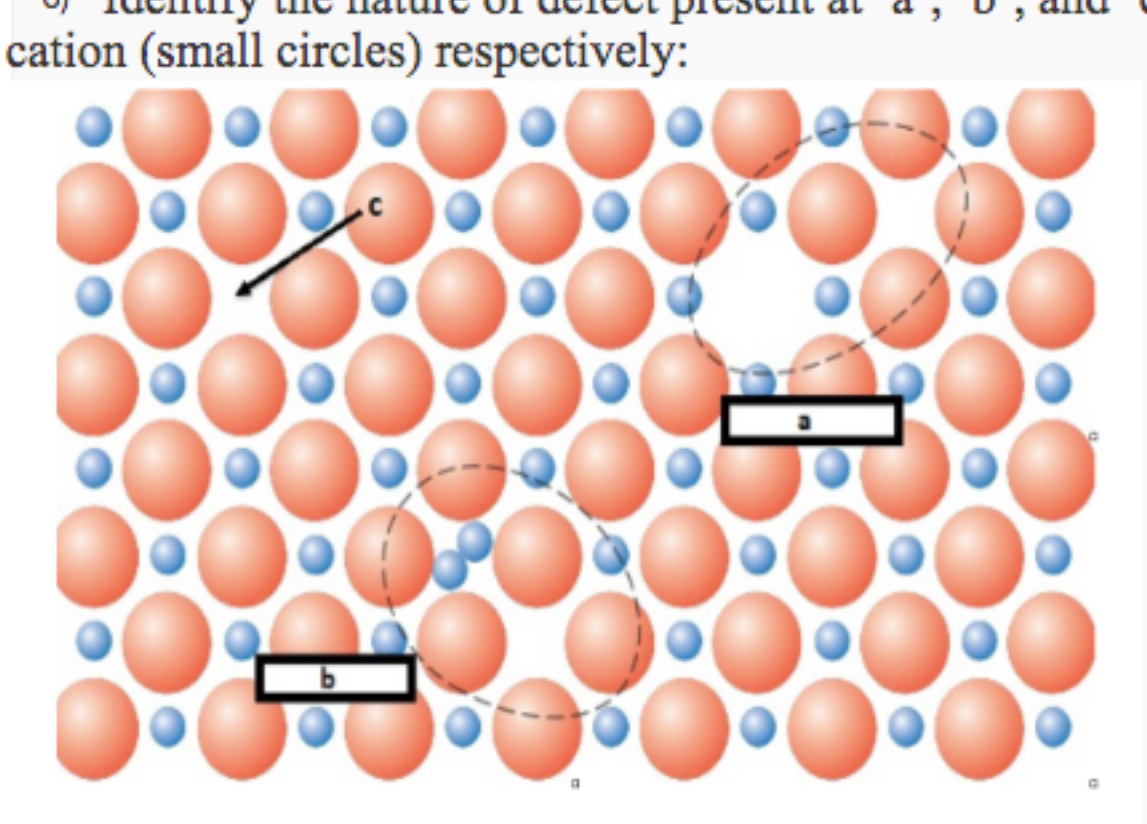
No, the answer is incorrect.
Score: 0
Accepted Answers:
$F^{2.0}$

5) Which of the following can be determined using X-ray diffraction technique of crystalline materials? *1 point*

- Lattice parameter
- Strain.
- Atomic size.
- Structure.

No, the answer is incorrect.
Score: 0
Accepted Answers:
Lattice parameter
Strain.
Structure.

6) Identify the nature of defect present at 'a', 'b', and 'c' in the schematics diagram of anion (bigger circles) and cation (small circles) respectively: *1 point*



- Frenkel, Schottky, cation vacancy defects
- Schottky, Anti-Frenkel, cation vacancy defects
- Anion vacancy, interstitial, cation vacancy defects
- Schottky, Frenkel, cation vacancy defects

No, the answer is incorrect.
Score: 0
Accepted Answers:
Schottky, Frenkel, cation vacancy defects

7) Stacking faults are *1 point*

- Point defects
- Line defects
- Surface defects
- Volume defects

No, the answer is incorrect.
Score: 0
Accepted Answers:
Surface defects

8) In a screw dislocation, direction of dislocation line movement is *1 point*

- parallel to both applied stress and Burgers vector
- perpendicular to both applied stress and Burgers vector
- perpendicular to applied stress and parallel to Burgers vector
- parallel to applied stress and perpendicular to Burgers vector

No, the answer is incorrect.
Score: 0
Accepted Answers:
perpendicular to both applied stress and Burgers vector

9) Formation of partials from a perfect dislocation results in the following situation(s): *1 point*

- Increase in the dislocation energy.
- Reduction in the dislocation energy.
- No change in dislocation energy.
- Dislocation energy may increase or decrease.

No, the answer is incorrect.
Score: 0
Accepted Answers:
Reduction in the dislocation energy.

10) If shear modulus and lattice parameter of a BCC crystal are 80.2 $GN.m^{-2}$ and 0.287 nm respectively, the elastic energy (in $J.m^{-1}$) of a line dislocation in the crystal is: *1 point*

- 0.83×10^{-9}
- 2.49×10^{-9}
- 1.65×10^{-9}
- 9.90×10^{-9}

No, the answer is incorrect.
Score: 0
Accepted Answers:
2.49×10^{-9}

11) Stress field around edge dislocations can be: *1 point*

- only tensile stress
- only compressive stress
- both tensile stress as well as compressive stress
- shear stress

No, the answer is incorrect.
Score: 0
Accepted Answers:
both tensile stress as well as compressive stress

12) Burgers vector of dislocations in NaCl crystal lattice is *1 point*

- 1/2 <100>
- <111>
- 1/2 <110>
- 1/2 <111>

No, the answer is incorrect.
Score: 0
Accepted Answers:
1/2 <110>

13) In an ionic solid, Frenkel defect reaction for a solid AX is (A: anion, X: cation, subscripts and superscripts depict the charges): *1 point*

- $X_X \longrightarrow (X_i)^{-1} + (V_X)^{+1}$
- $X_X \longrightarrow (X_i)^{+1} + (V_X)^{-1}$
- $A_A \longrightarrow (A_i)^{-1} + (V_A)^{+1}$
- $A_A \longrightarrow (A_i)^{+1} + (V_A)^{-1}$

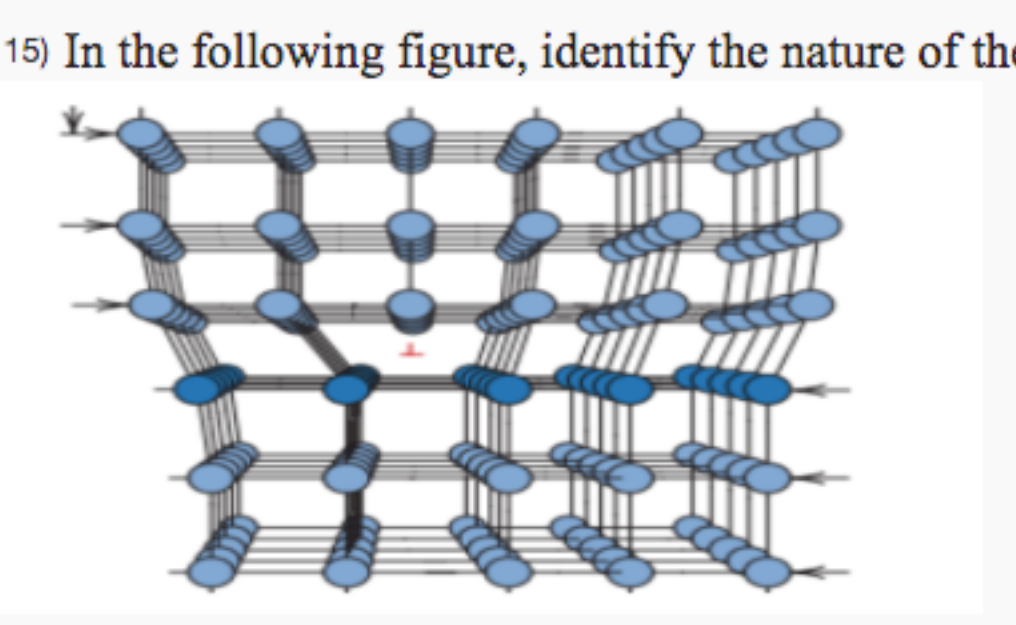
No, the answer is incorrect.
Score: 0
Accepted Answers:
$X_X \longrightarrow (X_i)^{-1} + (V_X)^{+1}$

14) The surface energy of a material *1 point*

- is related to number of bonds broken per unit area.
- is always positive.
- is always negative.
- increases with bond energy.

No, the answer is incorrect.
Score: 0
Accepted Answers:
is related to number of bonds broken per unit area.
is always positive.
increases with bond energy.

15) In the following figure, identify the nature of the dislocation *1 point*



- Negative edge dislocation
- Positive edge dislocation
- Positive screw dislocation
- Negative screw dislocation

No, the answer is incorrect.
Score: 0
Accepted Answers:
Positive edge dislocation