J-Mains

Q1) $r = \frac{a}{2\sqrt{2}} = \frac{361 \text{ pm}}{2 \times 1.41} \simeq 128 \text{ pm}$

Q2) Radius Ratio $= \frac{r^+}{r^-} = \frac{94}{146} = 0.64$

lies in Range 0.414-0.732 octahedral void

Q3) $r^+ + r^- = \frac{\sqrt{3}a}{2} \Rightarrow r^+ = \frac{\sqrt{3} \times 390}{2} - 180 = 158 \text{ pm}$

Q4) $\frac{\sqrt{3}a}{2} = 1.73 A^\circ \Rightarrow a = 2A^\circ$ or 200 pm

Q5) with increase in temperature, Resistance of metals increases, hence conductivity decreases.

Q6) $R = \frac{\sqrt{3}\,a}{4} \Rightarrow \frac{1.73 \times 351}{4} = 152\,pm.$

Q7) Atoms of A / unit cell = 1
atoms of B / unit cell = 4
Formula = $AB_4$.

Q8) Void space in HCP mode of Packing is 26%.

Q9 $a = \frac{4r}{\sqrt{2}} = \frac{4 \times 0.14}{1.4} = 0.4\,nm.$

Q10 Let the fraction be x
Avg Oxidation state $+\frac{3x + 2(1-x)}{x + 1 - x} = \frac{200}{98}$
$\therefore x = 4.08\%$

Q11 Total octahedral void per unit cell = 4
Atoms / unit cell = 4.
OHV per atom = 1.

Q12) In monoclinic unit cell.
$a \neq b \neq c$ and $\beta = \gamma = 90^\circ \neq \alpha$.

Q13) Appearance of colour in solid alkali metal halides is due to F-centres.

Q14) A atoms / unit cell = 1, B atoms / unit cells = 4 - 3
1 B missing, net B / unit cell = $3 - \frac{1}{2} = 5/2$
Formula $A_2B_5$

Q15) $r_{Cs^+} + r_{Cl^-} = \sqrt{3}\,a/2$

Q16) $r = \frac{\sqrt{3}\,a}{4} = \frac{1.73 \times 4.29}{4} = 1.86\,A^\circ$.

Q17) $CrO_2$ is metallic and ferromagnetic.

Q18) Closest approach b/w atoms = $\frac{\sqrt{2}\,a}{2} = a/\sqrt{2}$.

Q19 ) Presence of cations in interstial sites is called Frenkel defect.

Q20 ) CsCl form crystal having $Cs^+$ in cubic void and $Cl^-$ ion at every corner.

Q21 ) Antiferromagnetic substance have equal and opposite magnetic domains. ↑↓ ↑↓ ↑↓ ↑↓