MAHESH TUTORIALS SCIENCE

00 – 00		Q. Booklet Serial No: 0000	
Test No : 1052331	3 Hrs.		Q. Booklet Version : 11

Hints & Solutions

PART B - CHEMISTRY

31. **a)** K^+
K^+ ion will form most soluble hydroxide because it is an alkali metal and has low lattice low energy.

32. **a)** $1s^2 2s^2 2p^6 3s^4$
The 3s electron in A will be loosely held due to large size of atoms.

33. **b)** Mg, Sb
IE decreases as C > Si > Ge > Sn > Pb
IE of Sn < Pb due to poor shielding effect of d and f electrons in Pb.

34. **a)** Zero
Because, in general, these donot enter into chemical combination.

35. **d)** 3, 20
(Z = 3) : $1s^2\ 2s^1$
(Z = 20) : $1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6 4s^2$
Both of these elements belong to s-block.

36. **b)** 8
It is iron : $[Al]^{18}\ 4s^2 3sd^6$
for transition element group number
= (n – 1)d es + ns es
= 6 + 2 = 8

37. **a)** 33
$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$ has atomic no. = 15.
Element below it has atomic no. 15 + 18 = 33.

38. **d)** Noble gases
Chalcogens

39. **b)** Transition elements
Factual questions.

40. **b)** Cl

41. **a)** Gallium and germanium
Eka-aluminium is known as gallium and Ekasilicon is known as germanium because gallium is similar in properties to aluminium and one nest to it and germanium is similar in properties to silicon and one next to it. (Eka in Sanskrit means one)

42. **d)** Atomic size and nuclear charge both
Electron affinity decreases as the size of the atom increases and increase as the nuclear charge increases.

43. **a)** ionic
When the electronegativity difference is more than 1.7, the bond formed will be ionic in nature.

44. **b)** N^{3-}, F^-, Na^+
Isoelectronic species have same number of electrons, N^{3-} , F^- and Na^+ all have 10 electrons.

45. **b)** $Al_2O_3 < SiO_2 < P_2O_3 < SO_2$
Oxide of Al is amphoteric. SO_2 is more acidic than P_2O_3 . Therefore, correct order of acidic character is $Al_2O_3 < SiO_2 < P_2O_3 < SO_2$.

46. **c)** O^{2-}
Li^+ (Z = 3) : $1s^2$
F^- (Z = 9) : $1s^2 2s^2 2p^6$
B^{3+} (Z = 5) : $1s^2$

O^{2-}(Z = 8) : $1s^2 2s^2 2p^6$
The correct order of ionic radii is
$B^{3+} < Li^+ < F^- < O^{2-}$
For isoelectronic species, more the nculear charge, smaller the size. Further Li^+ and B^{3+} have only one shell and as such smaller than F^- and O^{2-} when have two shells.

47. **b)** inversely proportional to effective nuclear charge
Ionic radii are inversely proportional to the effective nuclear charge.

48. **b)** 69% Mg^+ + 31% Mg^{2+}
Energy absorbed in the ionisation of 1 mole of Mg(g) to Mg+(g) = 750 kJ
Energy left unused = 1200 – 750 = 450 kJ % of Mg^+ (g) converted into Mg^{2+}(g)
$= \frac{450}{1450} \times 100 = 31\%$
Thus the percentage of Mg^+ (g)
= 100 – 31 = 69%

49. **a)** I < Br < C*l*
Ionization energy decreases down the group i.e., the sequence of increasing order of ionization energies is
I < Br < C*l*

50. **b)** $N^{3-} > O^{2-} > F^- > Na^+ > Mg^{2+}$

51. **d)** F > N > O > C
IE_1 values decrease as
F > N > O > C

52. **d)** Na > A*l* > Mg > Si
IE_1 values inncreasea as Na < Al < Mg < Si.

53. **b)** $Na^+ <$ A*l* $< Mg < F^-$
Na^+ and F^- ions are isoelectronic, therefore F^- has largest and Na^+ has the lowest size. Further Al with higher nuclear charge has lower size than Mg.
Thus the overall order is $Na^+ <$ Al < Mg < F^-.

54. **c)** Na^-
$Na^- > Na > Na^+$.

55. **d)** $P^{3+} > P^{5+}$
P^{5+} has more effective nuclear charge than P^{3+} and is smaller in size than P^{3+}.

56. **b)** Be > Mg > Ca
IE_1 decrease from top to bottom in a group

57. **a)** K^+, Ca^{2+}, Sc^{3+}, C*l*$^-$
Species which have same no. of electron are said to be isoelectronic species.

58. **b)** B < S < P < F
B and F lie in the second period while P and S lie in the third period. Because of higher effective nuclear charge. $\Delta_i H_I$ of P ands S are higher than that of B but lower than that of F. Among P and S, P has higher $\Delta_i H_I$ due to exactly half filled configuration ∴ overall increasing order of $\Delta_i H_I$ is B < S < P < F i.e., (B) is correct

59. **b)** NO^+, C_2^{2-}, CN^-, N_2
Isoelectronic species have same number of electrons, NO^+, C_2^{2-}, CN^- and N_2 all have 14 electrons.

60. **b)** $S^{2-} >$ C*l*$^- > K^+ > Ca^{2+}$
In the formation of a cation, the electrons are lost from the outer valence shell and the remaining electrons experience a greater force of attraction by the nucleus. In other words, nucleus hold the remaining electrons more tightly and this results in decreased radii.
In case of anion formation, the addition of electron occurs in the same outer shell thus the hold of nucleus on the electron of outer shell decrease and results in

increased ionic radii.

$\therefore$ Order of ionic radii is $S^{2-} > Cl^{-} > K^{+} > Ca^{2+}$

These are isoelectronic species with 18 electrons each. More than nuclear charge, smaller is the size of the ion. Nuclear charge are S(16), Cl(17), K(19) Ca(20).