

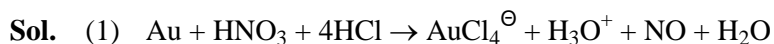
INORGANIC CHEMISTRY

GENERAL CHEMISTRY

1. With reference to *aqua regia*, choose the correct option(s). [JEE(Advanced) 2019]
- (A) Reaction of gold with *aqua regia* produces NO_2 in the absence of air
- (B) *Aqua regia* is prepared by mixing conc. HCl and conc. HNO_3 in 3 : 1 (v/v) ratio
- (C) Reaction of gold with *aqua regia* produces an anion having Au in +3 oxidation state
- (D) The yellow colour of *aqua regia* is due to the presence of NOCl and Cl_2
2. Not considering the electronic spin the degeneracy of the second excited state ($n = 3$) of H-atom is 9, where the degeneracy of the second excited state of H^- is [JEE(Advanced) 2015]
3. In an atom, the total number of electrons having quantum numbers $n = 4$, $|m_l| = 1$ and $m_s = -\frac{1}{2}$ is [JEE(Advanced) 2014]

SOLUTIONS

1. Ans. (B, C, D)



(2) Aqua regia = $3\text{HCl}(\text{conc.}) + \text{HNO}_3(\text{conc.})$

(3) AuCl_4^- is produced

(4) Yellow colour of aqua regia is due to its decomposition into NOCl (orange yellow) and Cl_2 (greenish yellow).

2. Ans. (3)

Sol. For H-atom the energy order of different subshells : $1s < 2s = 2p < 3s = 3p = 3d$

Hence in its 2nd excited state electron reaches to the shell number = 3

While for H^- ion (multielectronic system) the energy order of different subshell is $1s < 2s < 2p$

Hence in its 2nd excited state electron reaches to 2p subshell

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Hence degeneracy of 2nd excited state = 3

3. Ans. (6)

Sol. For $n = 4$, orbitals are

0

-1	0	+1
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-2	-1	0	+1	+2
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-3	-2	-1	0	+1	+2	+3
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Total number of orbitals having $\{|m_l| = 1\} = 6$

Total number of electrons having $\{|m_l| = 1 \text{ and } m_s = -\frac{1}{2}\} = 6$