(c) is correct because, electronegativity $= (I.P. + E.A.)/2$

7. **(b, c)**

8. **(b, c) :** Higher magnitude of charge and smaller interionic radius of MgO are responsible for higher lattice energy.

9. **(a,b,c,d) :** BrF_5 (12 electrons), SF_6 (12 electrons), IF_7 (14 electrons) and PCl_5 (10 electrons).

10. **(a, b) :** Amphoteric oxides are : Cr_2O_3, BeO, SnO, SnO_2, ZnO, Al_2O_3, PbO and PbO_2
Whereas, NO is a neutral oxide, B_2O_3 is an acidic oxide and CrO is a basic oxide.

11. **(b)**

12. **(a) :** Ionization energy increases abruptly at fourth ionization energy *i.e.* $IE_4 >>> IE_3$ and as the 4th electron requires very-very high energy for its removal as this electron is to be knocked out from the noble gas core. Hence, the number of valence electron is three.

13. **(c) :** He contains fully filled $1s^2$ orbital which has more penetrating effect and is very close to the nucleus and hence has highest value of ionisation energy. Chlorine has highest electron affinity amongst all the elements known, not helium.

14. **(4.8) :** $\underset{35.5}{Cl} + e^- \rightarrow Cl^- + \underset{3.7 \times 23.06\ \text{kcal}}{3.7\ \text{eV}}$

$\therefore$ Energy released for conversion of 2 g gaseous chlorine into Cl^- ions

$$= \frac{3.7 \times 23.06}{35.5} \times 2 = 4.8\ \text{kcal}$$

15. **(8) :** ${}^{63}_{29}Cu + {}^{1}_{1}H \rightarrow 6\,{}^{1}_{0}n + {}^{4}_{2}He(\alpha) + 2\,{}^{1}_{1}H + {}^{52}_{26}X$
Atomic number 26 represents Fe which belongs to group 8.

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Scientist of the Month

Erich Armand Arthur
Joseph Hückel
(9 August, 1896 - 16 February, 1980)

Early life and Education

Erich Armand Arthur Joseph Hückel was a German physicist and physical chemist.

Hückel was born in the Charlottenburg suburb of Berlin. He studied physics and mathematics from 1914 to 1921 at the University of Göttingen.

On receiving his doctorate, he became an assistant at Göttingen, but soon became an assistant to Peter Debye at Zürich. It was there that he and Debye developed their theory (the Debye–Hückel theory, in 1923) of electrolytic solutions, elucidating the behavior of strong electrolytes by considering interionic forces, in order to account for their electrical conductivity and their thermodynamic activity coefficients.

After spending 1928 and 1929 in England and Denmark, working briefly with Niels Bohr, Hückel joined the faculty of the Technische Hochschule in Stuttgart. In 1935, he moved to Phillips University in Marburg, where he finally was named Full Professor a year before his retirement 1961. He was a member of the International Academy of Quantum Molecular Science.

Contributions

He is known for two major contributions:

- The Debye–Hückel theory of electrolytic solutions.
- The Hückel method of approximate molecular orbital (MO) calculations on π-electron systems.

In 1930 he proposed a σ/π separation theory to explain the restricted rotation of alkenes (compounds containing a C=C double bond). This model extended a 1929 interpretation of the bonding in triplet oxygen by Lennard-Jones. According to Hückel, only the ethene σ-bond is axially symmetric about the C-C axis, but the π-bond is not; this restricts rotation.

In 1931 he generalized his analysis by formulating both valence bond (VB) and molecular orbital (MO) descriptions of benzene and other cycloconjugated hydrocarbons. Although undeniably a cornerstone of organic chemistry, Hückel's concepts were undeservedly unrecognized for two decades. His lack of communication skills contributed.

The famous Hückel $4n + 2$ rule for determining whether ring molecules composed of C=C bonds would show aromatic properties was first stated clearly by Doering in a 1951 article on tropolone.

In 1936, Hückel developed the theory of ϖ-conjugated biradicals (non-Kekulé molecules). The first example, known as the Schlenk-Brauns hydrocarbon, had been discovered in the same year.

In 1937 Hückel refined his MO theory of pi-electrons in unsaturated organic molecules. This is still used occasionally as an approximation, though the more precise PPP Pariser–Parr–Pople method succeeded it in 1953. "Extended Hückel MO theory" (EHT) applies to both sigma and pi-electrons, and has its origins in work by William Lipscomb and Roald Hoffmann for nonplanar molecules in 1962.

Award

1965 Otto Hahn Prize for Chemistry and Physics.

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